

**The Contribution of Employee Participation in IT-Projects in the Public  
Sector to Their Adoption of IT**

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**Dissertation**

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submitted by

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# **The Contribution of Employee Participation in IT-Projects in the Public Sector to Their Adoption of IT**

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## **Foreword**

During my studies in computer science at the University of Bremen, I came to find subjects related to human-computer interaction, socio-technical system design, and participatory software development highly interesting. This has led me, in my master's thesis, to investigate the user-participation factors that influence the success of IT applications, such as usability and information architecture. Alongside my study, I worked in the IT department of a public administration in Germany, where I experienced a series of e-government changes and the digitalization of public services. One such change was the introduction of an electronic document-management system called e-file. This system aimed to replace traditional paper-based filing systems, meaning it significantly impacted public servants' daily operations.

Amid the rollout of this system, my colleagues were both skeptical and fearful. Most were highly resistant to this change, especially given the rapid pace with which the traditional system was replaced. The fact that most employees were unfamiliar with this system heightened their resistance against its implementation. Working in the IT department - and, thus, being highly involved in such projects - I realized that change management focused so much on technical concepts that it failed to consider the needs of employees who are forced to adapt to new IT projects.

Experiencing this process in the public sector provided me with a new perspective on user participation in IT projects. I now aim to emphasize users' adoption of the software rather than the software itself.



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Ben Rehouma, Mariem (2018): Beteiligung der Beschäftigten bei IT-Projekten in deutschen Bundesbehörden. Multikonferenz Wirtschaftsinformatik (MKWI2018), 2018, Lüneburg, Deutschland S. 645-656	P2
Ben Rehouma, Mariem (2020): Exploring the Role of Participation in Government Employees' Adoption of IT: A Qualitative Study of Employees' Participation in the Introduction of the E-File in Germany. IJPADA: Volume 7, Issue 1, pp. 33-46.	P3
Ben Rehouma, Mariem; Kahl, Timo; Geyer, Tim (2020): Investigating Change Management Based on Participation and Acceptance of IT in the Public Sector: A Mixed Research Study. IJPADA: Volume 7, Issue 4, Article 4.	P4
Ben Rehouma, Mariem (2019): Employees' Participation in IT-Projects in the Public Sector: Mapping Participation to the Project Lifecycle. IJPADA: Volume 6, Issue 2, pp. 20-34.	P5
Ben Rehouma, Mariem; Distel, Bettina; Hofmann, Sara; Ogonek, Nadine (2021): The Role of Public Sector Managers in Employees' Use of Information Technology. Digital Government Research and Practice (DGOV).	P6
Hofmann Sara; Ben Rehouma Mariem; Distel, Bettina; Ogonek, Nadine (2021): Uncovering the Multifaceted Concept of Digitalisation: How Do Researchers and Practitioners Define Public Sector Digitalisation? Government Information Quarterly (GIQ).	P7

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## Abstract

The success of digitalization in the public sector largely depends on employees' adoption of new technology. Employee participation in IT projects in the public sector constitutes an important nevertheless not yet investigated factor that should play a critical role in employees' adoption of IT in this sector. This dissertation aims to ascertain how participation can contribute to employees' adoption of new technology in the public sector. To achieve this purpose, this research focuses primarily on the introduction of the electronic files in German public administrations as an example of IT-projects in the public sector. It follows a mixed-methods research design including literature reviews, qualitative and quantitative methods conducting seven distinct studies. The findings of this dissertation emphasize the critical role of employee participation in IT projects, validating the empirical evidence of the relationship between employee participation in IT projects and their adoption of IT. Furthermore, this dissertation identifies the role of managers, in terms of their exemplary function and applying of management measure to ensure the use of IT in their organizations as a further factor in this context. This research identifies several opportunities for employee participation in the IT-introduction process in the public sector and provides fundamental aspects to successful integrate such opportunities in practice. Based on its findings, this dissertation introduces an employee-participation framework encompassing the facilitators of and barriers to participation in the public sector. Furthermore, it presents concrete recommendations for boosting employee participation in IT projects in the public sector. In addition to these practical contributions, this dissertation contributes to the theoretical understanding of employees' adoption of IT in the public sector by identifying of factors with public sector peculiarities and validating the empirical evidence between employees' participation and their adoption of IT.



## Kurzfassung

Der Erfolg der Digitalisierung im öffentlichen Sektor hängt stark von der Akzeptanz der eingeführten Technologie durch die Mitarbeiter:innen ab. Die Beteiligung der Mitarbeiter:innen an IT-Projekten stellt im öffentlichen Sektor einen wichtigen, jedoch noch nicht untersuchten Faktor dar, der die IT-Akzeptanz bei den Mitarbeiter:innen in diesem Sektor erhöhen soll. In dieser Dissertation wird untersucht, wie Beteiligung der Mitarbeiter:innen zur Akzeptanz der IT im öffentlichen Sektor beitragen kann. Um das Ziel zu erreichen, wurde in dieser Dissertation die Einführung der elektronischen Akte in öffentlichen Verwaltungen in Deutschland für die Untersuchung als Beispiel für IT-Projekte im öffentlichen Sektor verwendet. Es wurden insgesamt sieben Studien mittels Mixed-Methods-Forschungsansatz mit Literaturreview, qualitative und quantitative Methoden durchgeführt. Die Ergebnisse dieser Dissertation untermauern die entscheidende Rolle, die die Beteiligung von Mitarbeiter:innen an IT-Projekten spielt und validieren die empirische Evidenz des Zusammenhanges zwischen der Beteiligung von Mitarbeiter:innen an IT-Projekten und ihrer Akzeptanz von IT. Darüber hinaus wurde die Rolle von Führungskräften im Hinblick auf ihre Vorbildfunktion und ihre Anwendung von Führungsmaßnahmen zur Sicherstellung der IT-Nutzung in ihrer Organisation als weiterer Faktor identifiziert. Darüberhinaus, wurden in dieser Dissertation einige Möglichkeiten der Beteiligung entlang des Einführungsprozesses von IT im öffentlichen Sektor identifiziert sowie grundlegende Aspekte zur erfolgreichen Integration von Beteiligungsmöglichkeiten in der Praxis festgestellt. Basierend auf die Ergebnisse in dieser Dissertation, wurde ein Framework für die Beteiligung von Mitarbeiter:innen an IT-Projekten im öffentlichen Sektor entwickelt, welches sowohl Treibern als auch Hindernisse von Beteiligung umfasst. Darüber hinaus wurden Empfehlungen zur erfolgreichen Integration von Beteiligung von Mitarbeiter:innen an IT-Projekten im öffentlichen Sektor ausgesprochen. Zusätzlich zu diesen praktischen Implikationen, trägt diese Dissertation zum theoretischen Verständnis der IT-Akzeptanz von Mitarbeiter:innen im öffentlichen Sektor bei, indem Faktoren mit Besonderheiten des öffentlichen Sektors identifiziert wurden und die empirische Evidenz zwischen der Beteiligung der Mitarbeiter:innen und ihrer IT-Akzeptanz validiert wurde.



## Part A - Research Summary



## 1. Introduction

### 1.1. Motivation

In recent decades, the public-sector use of information and communication technologies (ICTs) has extended beyond the rudimentary use of simple tools for administrative support to the integration of ICTs throughout government operations (Liu & Yuan, 2015). Governments around the world are digitizing many administrative documents and procedures as part of electronic-government (e-government) efforts aimed at improving governmental efficiency, effectiveness, transparency, and responsibility (Haag, Born, Kreuzer, & Bernius, 2013). E-government refers to “the use of information technology to enable and improve the efficiency with which government services are provided to citizens, employees, businesses and agencies” (Bélanger, Tech, & Carter, 2012). It encompasses several facets of public-sector digitalization, such as the process of modernization from paper-based to digital processes (Chun, Shulman, Sandoval, & Hovy, 2010).

The German public sector undergo also digitalization changes, which are legally defined on the federal level in the E-Government Act (EGovG) and the Online Access Act (OZG) as well as in the jurisdiction of the individual federal states. The electronic file (e-file), a basic e-government service, represents one of the key IT projects in the German initiative pursuing the modernisation of public administrations through the digitalisation of internal administration processes; it constitutes a standard electronic channel used in German public administrations (BMI, 2014). In order to increase operational effectiveness, determine document flow, and dictate both internal and external operational processes, many governments today are implementing the e-file (Abdulkadhim, Bahari, Bakri, & Ismail, 2015).

The e-file covers various electronic processes, including document imaging, document retrieval, reporting, character recognition, document management, workflow, form processing, content management, digital signature management, storage and archiving technologies, business process management, and collaboration (Alshibly, Chiong, & Bao, 2016). It saves paper, speeds up communications, and increases productivity (Hung, Tang, Chang, & Ke, 2009). By introducing the e-file, the German government aims to achieve paperless agencies while boosting effectiveness and efficiency (Distel, 2016). However, such intergovernmental IT projects pose technological and organizational challenges, especially in terms of user adoption (Hung, Chang, & Yu, 2006; Hung et al., 2009). Such changes, in addition to influencing productivity and governmental coordination, transform the everyday work practices

of many public-sector employees (Runardotter, Mörtberg, Mirijamdotter, & Se, 2011).

Despite the unwavering interest in public-sector digitalization, most public-sector IT projects fail (The Standish Group, 2015). Public-sector IT projects fail due to employee resistance to new technology (Ashraf, Khattak, & Mohsin, 2010). In particular, employee resistance to shifts toward modern technologies at the workplace is a major problem of e-government implementation and one of the main reasons behind the failure of digital government execution (Basyal & Seo, 2017). The success of public-sector IT projects, such as the e-file, strongly depends on the adoption of users (Viswanath Venkatesh, & Davis, 2000) and the usage behavior of administrative staff (Distel, 2016). Investigating factors related to IT usage behavior or intentions toward that usage is a central focus of IT-adoption research (Schwarz & Chin, 2007). Public-sector employees seem to perceive more barriers to innovation work behavior (IWB) than their private-sector counterparts (Nijenhuis, 2015). Reasons behind this resistance are manifold and extend beyond the technological aspects of particular systems, often including personal aspects (Distel, 2016). Public sector employees often resist changes because they feel threatened (Horton, 2003a). According to statistics on e-government projects in German-speaking regions, user fear and anxiety still constitute one of the major barriers hindering the success of such projects in the public sector (Schulz-Dieterich, 2016).

Change management approaches in the public sector must recognize, appreciate, and respond to staff fears and concerns (Coram & Burnes, 2001). Change management approaches based on participation play a particularly important role in ensuring public-sector employees' adoption of change (O'Brien, 2002). Several studies have recognized the fundamental role of employee participation in the public-sector change process to overcoming resistance to change (e.g., Fernandez & Rainey, 2006; O'Brien, 2002; Reid, Riemenschneider, Allen, & Armstrong, 2008). For instance, continually meeting with employees from different departments and at different hierarchical levels can aid in reducing barriers to change by fostering psychological ownership, promoting the dissemination of critical information, and encouraging employee feedback (Fernandez & Rainey, 2006).

## 1.2. Problem Statement and Research Questions

Although employee participation is supposedly a key factor in IT adoption in the public sector, research on this matter is limited. This dearth of research applies to how employees should or could participate in IT projects in the public sector and to empirical evidence on the relationship between participation and adoption.

Research on employee participation in the change process - and, in particular, in the IT-implementation process - agree on the approach's benefits. Employees can solve problems based on their expertise, as they possess insights into how and why things get done; encouraging them to share their ideas can support and cement the change process (James Roughton, 2015). Every employee can offer their own implicit knowledge of and experience in government processes, which can aid in the efficient implementation of e-government projects (A. A. Khan & Baliwada, 2017). Axelsson, Melin, and Lindgren (2013) argue that e-government projects should incorporate stakeholder participation during the IT-introduction process, as it influences stakeholders' attitudes toward the project. They recommend further research into cases of stakeholder participation in e-government projects.

Various studies have advocated for employee participation in IT projects in the public sector and appeal for structured participation guides and instructions for user-participation activities in e-government projects (e.g., Axelsson et al., 2013; Følstad, Jørgensen, & Krogstie, 2004). To advance this discourse, research must look at how users should participate in public-sector IT projects and investigate the causality between user participation and IT adoption (Axelsson et al., 2013; Holgersson, Melin, Lindgren, & Axelsson, 2018).

To address this gap, this dissertation poses the following research question:

*RQ: How can participation contribute to employees' adoption of IT in the public sector?*

The main purpose of this thesis is to advance this field of research with new theoretical and practical contributions by providing valuable insights into how employee participation can improve IT adoption in the public sector. This thesis investigates employees' participation in the introduction of the e-file in German public administrations as an example of an intergovernmental and inter-jurisdictional e-government project in a developed country.

Research on adoption of IT in the public sector often focuses on citizens' adoption of e-government services while neglecting the internal perspective. Existing scientific research on the employee perspective in the public sector (government to employee [G2E]) is scarce and chiefly concentrated on the factors that typically influence IT adoption, such as perceived usefulness and perceived ease of use (Hung et al., 2009). As previously noted, despite employee participation supposedly playing a critical role in their adoption of IT in the public sector, there is a dearth of research on this relationship. Therefore, it is important to explore participation

and IT adoption - and the ways in which they interact - from the perspective of public-sector employees. Thus, the first sub-research question guiding my research is as follows:

*RQ1: What role does participation have in employees' adoption of IT in the public sector?*

This part of my research aims to investigate the relationship between employee participation in IT projects in the public sector and their adoption of IT; it identifies how participation plays a role in this context.

In doing so, the first two studies (P1 and P7) focus on identifying employees' understanding of digitization in the public sector and the factors that influence their adoption of IT. These studies help to identify the state of research in this field and understand the positioning of participation in this context. In addition, P1 analyzes these factors in detail with regard to the peculiarities of the public sector; it explores gaps and outlines the needs of future research in this field.

The next four studies (P2, P3, P4, and P6) focus on identifying the role of participation for and its influence on employees' adoption of IT in the public sector. The second study (P2) aims to identify the ways in which public sector employees participate in IT projects in practice. After identifying the current state of employees' participation in IT projects in German public administrations in this study, the third research study (P3) explores the role of participation in public-sector employees' adoption of IT while P6 highlights the particular role of managers. Based on these results, P4 quantitatively investigates the empirical evidence regarding the influence of employee participation on IT adoption in the public sector.

Since the main purpose of this dissertation is to identify how employee participation can contribute to IT adoption in the public sector, the second part of my research uses the findings from the first part to investigate how employees can and should participate in IT projects (P5) and to identify key aspects helping to integrate employee participation opportunities in such projects (qualitative study in P4). These studies provide an overview of potential opportunities for employee participation in the IT-introduction process and shed light on the importance of developing approaches based on employee participation to achieve successful IT implementation and adoption in the public sector.

Therefore, the second sub-research question guiding my research is as follows:

*RQ2: How can participation opportunities be integrated into IT projects to increase the adoption of IT in the public sector?*

### 1.3. Structure of the Dissertation

This PhD thesis - a cumulative dissertation - is presented in two major parts: Part A includes the research summary while Part B consists of the publications of the dissertation.

The research summary (Part A) introduces my motivations behind this dissertation and presents the problem statement, overall research question (RQ), and sub-research questions (RQ1 and RQ2).

Section 2 of the research summary provides an overview of the theoretical background of public-sector digitalization, employee participation, and relevant theories and models in IT-adoption research. Section 3 details the applied research design and methodology. Afterward, Section 4 presents and discusses the findings of my investigation, offering a positioning of the dissertation and answering the research questions. Section 5 concludes by detailing this dissertation's theoretical and practical contributions, discussing its limitations, and suggesting paths for further research.

Part B of the dissertation presents the publications (P1, P2, P3, P4, P5, P6, and P7), which consist of completed research papers that were either published in or submitted to conferences or journals. Only P7 is yet in submission process. Each paper in Part B is prefaced with bibliographical information regarding the outlet and the status of the publication. Furthermore, it is important to note that the numbering of the papers does not reflect chronological order or a sequence in answering the research questions.

Table 1 provides an overview of the dissertation's research questions and the papers that have addressed them.

Table 1 Overview of the research questions and the papers addressing them

<b>RQ:</b> How can participation contribute to employees' adoption of IT in the public sector?	
<b>Sub-Research Questions</b>	<b>Papers</b>
<b>RQ1:</b> What role does participation have in employees' adoption of IT in the public sector?	P1, P2, P3, P4, P6, and P7
<b>RQ2:</b> How can participation opportunities be integrated in IT projects to increase the adoption of IT in the public sector?	P4 and P5

In addition, all of the papers are in English. Only P2 is written in the German language. In order to facilitate the flow of this document, I have included a translated abstract of this paper in English. Importantly, the studies in this dissertation were conducted in Germany, and the data was gathered and analyzed in the German language. Thus, the English translations could differ slightly from the original statements. Furthermore, all of the papers were adjusted to ensure standardized styling, formatting, and citations.

## 2. Theoretical Background

This section provides an overview of the relevant theories, conceptual foundations, and works that form the basis of my dissertation. I first give an overview of public-sector digitalization and the e-file with a particular focus on user adoption. Then, I detail the research stream regarding IT adoption and discuss the most prominent theories and models in this field. Finally, I present previous research on employee participation, particularly within public-sector IT projects, and provide the definition of participation that I employ in this research.

### 2.1. The Introduction of the E-File in Public Administrations as an Example of Public-Sector IT Projects

Many governments worldwide are digitizing most of their services and processes as part of an e-government strategy in order to increase governmental efficiency, effectiveness, transparency, and responsibility (Haag et al., 2013). The digitalization of the public sector refers to the use of information and communication technologies (ICTs) by government organizations to execute their business and management processes (Meijer, 2007). It includes several aspects, such as electronic services and democracy (with a focus on the relationship between governments and their citizens [G2C]), electronic management (with a focus on internal governmental aspects [G2G]), and electronic business (with a focus on the relationship between governments and the business sector [G2B]) (Lee & Huang, 2014). Public administrations are digitizing their transactions, procurements, documents, operations, and resources while implementing electronic document management systems and e-files (Abdulkadhim et al., 2015).

The e-file is the most popular intergovernmental service (Hung et al., 2009) and one of the major IT projects in the modernization of public administrations; it enables the creation, storage, organization, transmission, manipulation, updating, and accessibility of digital documents (Roldán & Afonso, 2012). In Germany, the E-Government Act obliges administrations to use electronic communication channels and digitalize their administrative procedures. Various digitalization projects are currently underway or planned as part of the strategic alignment of public administrations at the federal, state, and local levels in Germany. German public administrations are implementing the e-file with the aim of going paperless while increasing administrative efficiency and productivity (Distel, 2016). The e-file is ubiquitous, enabling administrative staff to quickly retrieve information relevant to processing, store information in a central, accessible location, and work without media discontinuity

(Distel, 2016). It is a critical IT system that can be also defined as “the application of technology to save paper, speed up communications, and increase the productivity of business processes” (Hung et al., 2009). It entails an “automated system which supports the creation, use and maintenance of paper or electronic documents and records for the purposes of an organization’s workflow and processes” (Abdulkadhim et al., 2015).

## 2.2. IT Adoption and Employees’ Adoption of the E-File in the Public Sector

As noted in the introduction section, employee resistance to use IT at the workplace makes public-sector IT projects challenging in terms of user adoption (Ashraf et al., 2010). The lack of employee adoption of IT is one of the main factors hindering the implementation of IT projects in the public sector worldwide (Al-Hashimi, Shakir, Hammood, & Eldow, 2017; Distel, 2016).

There is a rich body of literature on IT adoption in the public sector. However, most existing studies focus on the interaction between governments and citizens, considering citizens as the main stakeholder in the adoption of e-government services. They mainly address adoption factors based on standard IT-adoption models (see Section 2.3), such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), and investigate, for example, perceived ease of use and perceived usefulness to predict citizens’ adoption of e-government services (e.g., Alomari, 2014; Hujran, Aloudat, & Altarawneh, 2013; Sang & Lee, 2009; Sipiør, Ward, & Connolly, 2011). They also investigate other factors, such as trust, privacy, and security (e.g., Bélanger & Carter, 2008; Reddick, 2005; Sang, Lee, & Lee, 2009). Another central research stream of IT adoption research in the public sector seeks to enhance the relationship between government and business. Perceived benefits, external pressure, cost, social influence, and organization size are important adoption factors of electronic government services (e.g., e-invoicing) among business organizations (Arendsen & Van de Wijngaert, 2011; Tung & Rieck, 2005). A modest research stream in the literature has looked at the government’s perspective regarding IT adoption in public organizations. For example, Jun and Weare (2011) examined the effect of public organizations’ institutional motivations on the adoption of innovation in public organizations, finding that local governments are more motivated to innovate by external environmental factors than internal organizational pressures. Korteland and Bekkers (2008) looked at why public organizations innovate, arguing that functional, political, and institutional patterns should be considered by investigating the diffusion of public-sector innovations in electronic service delivery. Hofmann,

Räckers, and Becker (2012), in a literature review, identified performance expectancy, effort expectancy, and facilitating conditions as main factors used to explain employees' adoption of IT in the public sector.

Existing research on employees' adoption of the e-file have emphasized the role of technological aspects in the success of such IT projects, ignoring the role of the employees themselves (Hung et al., 2009). The few studies that have investigated employees' adoption of the e-file have reported on several factors that influence adoption (e.g., Abdulkadhim et al., 2015; Hung et al., 2009; Roldán & Afonso, 2012). For instance, Al-Shibly (2014) found, using the TAM, that system characteristics constitute the most significant determinant of employees' adoption of the e-file. Abdulkadhim et al. (2015) employed the UTAUT and found that performance expectancy, effort expectancy, social influence, and facilitating conditions positively influence employees' intention to use the e-file. Hung et al. (2009) used the Theory of Planned Behavior (TPB) as a theoretical framework to investigate the effect of a set of antecedent factors, including perceived usefulness and perceived ease of use, on employees' intentions to adopt the e-file. They also found that training and compatibility significantly influence employees' intentions to use intergovernmental services, such as the e-file. They argue that researchers should focus more on employees' perspectives with regard to the adoption of intergovernmental e-government services.

Investigations into the influence of employee participation in this context remain scarce. Those that do exist typically employ quantitative approaches to investigate the standard determinants of user adoption, such as perceived usefulness and ease of use (e.g., Hung et al., 2009) or performance expectancy and effort expectancy (e.g., Roldán & Afonso, 2012). These determinants are standard factors in theories and models of IT adoption; they have been extensively investigated in IT-adoption research in the e-government context.

Despite the wide body of knowledge in IT adoption in the public sector, research addressing the employees' perspective in this context is rare (Distel, Hofmann, & Madsen, 2020). Research on e-file adoption recognizes the importance of employee adoption in the success of IT introductions in the public sector. Nevertheless, public-sector employees' adoption of such IT projects is barely addressed in the literature (Roldán & Afonso, 2012). In addition, as discussed in Section 1.2, both practitioners and researchers view employee participation in IT projects as a key factor of the adoption in the public sector. Still, there is a clear lack of the employee perspective in public-sector IT-adoption research, especially when it comes to addressing

employee participation as adoption factor. Therefore, it is necessary to conduct an in-depth analysis of the factors influencing public-sector employees' adoption of IT and to identify the positioning of participation in this context.

The following section presents an overview of the prominent theories and models of IT-adoption research.

### 2.3. IT-Adoption Theories and Models

The terms “adoption” and “acceptance” are widely used as synonyms in the literature. However, a distinction is sometimes made with regard to frequency of use. The term “adoption” refers to the user’s decision to use a system for the first time; the term “acceptance” refers to the post-adoption stage (Hofmann, 2012). Etymologically, the term “acceptance” comes from “accept” or “approve” and means “the action or result of the action of the verb” (Schwarz & Chin, 2007). Schwarz & Chin (2007) explored five dimensions of acceptance: (1) to take what is offered; (2) to grasp or use the IT; (3) to assess (which is closely linked to well-known concepts, such as relative advantage and perceived usefulness); (4) to be given (which means being willing to tolerate the change brought about by the IT); and (5) to identify oneself with the change. Karahanna, Straub, and Chervany (1999) assert that while post-adoption beliefs are formed based on experience with IT, pre-adoption beliefs are generally formed based on indirect experience. Other studies argue that since the use of IT is often mandatory - meaning the decision to use the system is not driven by the user - the adoption of IT is symbolic, referring to the mental acceptance of an innovation rather than the actual use of the innovation (Khosrow-Pour, 2002). While the use of the e-file is mandatory in public administrations, I nevertheless use the term “adoption” as synonymous with the term “acceptance” throughout my dissertation, only distinguishing between them when one is explicitly mentioned in cited research.

IT adoption at the workplace can be defined as “the degree of willingness to use the possibilities offered by the information processing related to tasks at the workplace” (Stahlknecht & Hasenkamp, 2002). Stahlknecht and Hasenkamp (2002) analyzed IT adoption with a wide range of characteristics from rejection through indifference to approval. Approval is defined as voluntary acceptance in contrast to rejection, which is defined as a negative acceptance or resistance; indifference is defined as forced or tolerated acceptance. Dillon and Morris (1996, p. 5) define user adoption as “the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support.” IT adoption is also described as

a state illustrated by the adoption and use of these applications with changing characteristics and forms over time (Wilhelm, 2011).

Generally, IT-adoption research investigates factors that influence individuals' use of IT. The following sections outline prominent theories and models of IT adoption: the Theory of Reasoned Action (Fishbein & Ajzen, 1975), the Theory of Planned Behavior (Ajzen, 1991), the Technology Acceptance Model (Davis, 1986), the Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003), and the Diffusion of Innovation Theory (Rogers, 1995). This section clarifies the state of research described in Section 0 and the origin of the constructs used in the hypothesis of this dissertation.

### ***The Theory of Reasoned Action (TRA)***

The TRA, which emerged from sociopsychology to explain volitional behavior, posits that behavioral intention is the strongest predictor of volitional behavior (Dillard & Pfau, 2002). According to the TRA, the intention to perform a behavior is influenced by one's attitude toward this behavior and subjective norms (Dillard & Pfau, 2002).

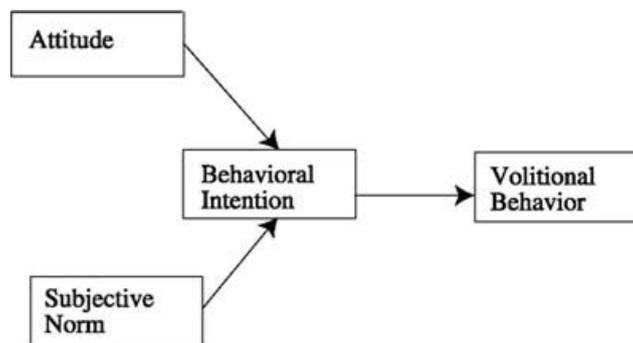


Figure 1 The Theory of Reasoned Action (Dillard & Pfau, 2002)

Subjective norms refer to the perception that some people in one's social environment approve or disapprove of a particular behavior. Attitude toward a behavior is determined by one's personal beliefs, which describe the perception and evaluation of the consequences of performing this behavior (Fishbein & Ajzen, 1975). While some authors argue that usage voluntariness is a crucial factor for the validation of the TRA (Taherdoost, 2018), others report strong predictive utility even in studies involving no voluntary behavior (Dillon & Morris, 1996).

### ***The Theory of Planned Behavior (TPB)***

The TPB stems from Ajzen (1991) expanding the TRA with the determinant “perceived behavioral control” - referring to “people’s perception of the ease or difficulty of performing the behavior of interest” - as the third antecedent of behavioral intention. The TPB posits that behavioral intention can determine behavior only if one can decide whether to perform the behavior (i.e., if the behavior is under volitional control) (Ajzen, 1991).

### ***The Diffusion of Innovation Theory (DOI)***

The DOI follows an approach distinct from those of the TRA and the TPB. It aims to explain how a technological innovation moves from its invention to widespread use (Dillon & Morris, 1996). Rogers (1995) defines diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system.” According to the DOI, the spread of a new idea is influenced by four main elements: innovation, communication channels, time, and social system. In addition, five characteristics should affect the diffusion of an innovation: Observability (the degree to which the results of an innovation are visible to potential adopters), relative advantage (the degree to which an innovation is perceived as better than the idea it supersedes), compatibility (the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters), complexity (the degree to which an innovation is perceived as difficult to understand and use), and trialability (the degree to which an innovation may be experimented with on a limited basis) (Rogers, 2003). Rogers (1995) frames the diffusion of an innovation as a process that begins with the knowledge of the existence of this innovation and attempts at persuasion. The persuasion stage is then followed by the decision to adopt or reject the innovation. The DOI treats system characteristics, organizational attributes, and environmental aspects with less explicit focus on user acceptance than other adoption models (Dillon & Morris, 1996; Taherdoost, 2018).

### ***Technology Acceptance Model (TAM)***

Since the TRA and TPB addressed individuals’ general behavior, several models were developed to predict user acceptance of technology. The TAM was developed by Davis (1986) and focuses on predicting IT acceptance and design problems by postulating that perceived usefulness (PU; U in Figure 2) and perceived ease of use (PEOU; E in Figure 2) significantly

influence a user's attitude toward using a system (Dillon & Morris, 1996).

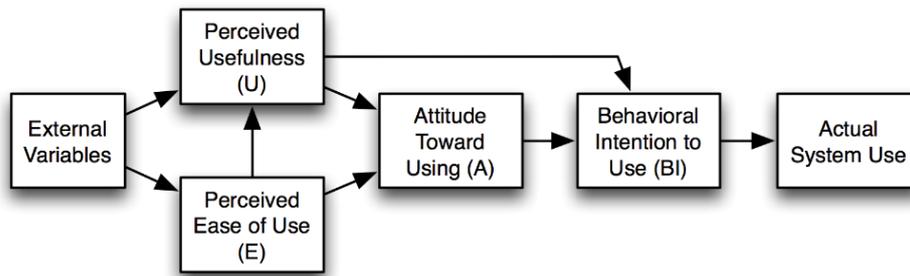


Figure 2 The Technology Acceptance Model TAM (Davis, Bagozzi, & Warshaw, 1989)

Fred D. Davis (1986, p. 26) clearly defines several TAM constructs: PU is “the degree to which an individual believes that using a particular system would enhance his or her job performance”; PEOU is “the degree to which an individual believes that using a particular system would be free of physical and mental effort”; attitude is “the degree of evaluative affect that an individual associates with using the target system in his or her job”; and use is “an individual’s actual direct usage of the given system.”

According to the TAM, one’s decision to actually use or not use a system is driven by their behavioral intention (BI). User attitude toward (A) using a system is influenced by PU and PEOU, and BI is a function of A and U. While the TAM emerged from the TRA, it does not deal with users’ subjective norms. Rather, it argues that this construct is context-driven and is not an important predictor of intentions; additionally, system use is not likely driven by social influences (Dillon & Morris, 1996). In addition, the TAM is more appropriate for individual contexts rather than organizational and institutional contexts, in which rules guide employee behavior (Ajibade, 2018).

### ***The Unified Theory of Acceptance and Use of Technology (UTAUT)***

The UTAUT was developed by analyzing eight theories and models - including the TRA, TAM, and DOI - to achieve a unified view of user acceptance (Venkatesh et al., 2003). This model serves as a useful tool for managers to understand and assess the likelihood of users’ acceptance of a new technology in an organization (Gupta, Dasgupta, & Gupta, 2008).

Within the UTAUT, four core constructs determine users’ intention and use behavior (see Figure 3). While performance expectancy and effort expectancy reflect the concepts of TAM,

perceived usefulness and perceived ease of use, respectively, social influence is defined as “the degree to which an individual observes others’ opinions about the use of a system” and facilitating conditions is defined as “the degree to which an individual believes that organizational and technical infrastructure is in place to support the use of the system” (Venkatesh et al., 2003). According to the UTAUT, both behavioral intention and facilitating conditions are significant predictors of usage behavior.

The four constructs are moderated by gender, age, experience, and voluntariness of use, as depicted in Figure 3.

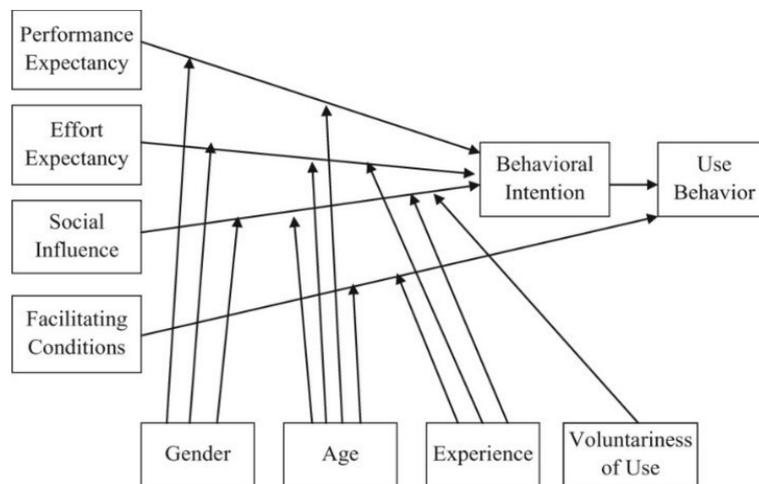


Figure 3 The Unified theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

Venkatesh et al. (2003, p. 471) assert that, with UTAUT, “We may be approaching the practical limits of our ability to explain individual acceptance and usage decision in organizations.” Still, the relationships proposed in this model cannot be copied exactly, as the research in their study was cross-sectional, did not test different time periods, and did not measure actual usage behavior (Taherdoost, 2018).

The following sections provide an overview of the definitions of employee participation and the ways in which employee participation in public-sector IT projects has been addressed in research.

## 2.4. Employees Participation in IT-Projects in the Public Sector

### 2.4.1. Definition of Participation

The term “participation” refers to “taking part” and means “to contribute to something” (Hartwick & Barki, 1994). The concept of participation is common in various fields, including social science, political science, economics, and business management. Therefore, there is no universal definition of this concept. Employee participation can be defined as “the totality of forms, i.e., direct (personal) or indirect (through representatives or institutions) and of intensities; i.e., ranging from minimal to comprehensive, by which individuals, groups, collectives secure their interests or contribute to the choice process through self-determined choices among possible actions during the decision process” (Heller, Pusic, Strauss, & Wilpert, 1998, p. 42). Direct participation is considered to be the ideal form of participation, referring to the immediate, personal involvement of organization members in decision-making; indirect participation implies mediation through representatives, such as a lobby or staff council (Dachler & Wilpert, 1978). Marchington and Wilkinson (2005) categorized direct employee participation into four categories: downward communications, upward problem solving, task-based participation, and teamwork and self-management. Downward communication is viewed as the weakest category of direct participation and presents a way to convey information. This can be achieved through open communication about new developments within an organization using various mechanisms, such as formal documents sent to all employees and face-to-face interactions between line managers and their staff. Upward problem solving is based on employees’ knowledge and ideas. Task-based participation incorporates training, managerial, and supervisory responsibilities. Finally, teamwork and self-management entails responsibility for an entire task, working without a direct supervisor, discretion regarding work methods and time, and the encouragement of team members to organize and use multiple skills. According to Wilkinson et al. (2010, p. 9), employee participation refers to “the range of mechanisms used to involve the workforce in decisions at all levels of the organization, whether undertaken directly with employees or indirectly through their representatives,” with information and consultation as its two main components. Wilkinson et al. (2010) equate information in this context with the provision of data about the business to the employees or their representatives and consultation with the exchange of views between employers and employees or their representatives. Furthermore, employees can participate at various levels, ranging from trivial task-based concerns to strategic corporate concerns (Wilkinson et al., 2010).

Dachler and Wilpert (1978) postulate that participation in decision-making implies a base of legitimacy or power and may vary from formal to informal participation depending on the underlying values of the designers, the objectives that participation serves to achieve, and the particular organizational and social contexts in which the participatory system exists. Formal participation requires legal bases, such as rules and agreements imposed on the organization; informal participation is non-statutory and centers more on consensus between participants.

In addition to the form of participation (direct, indirect, formal, informal), participation can be categorized by degree, level, and range of subject (Wilkinson et al., 2010). Marchington & Wilkinson (2005) frame participation as an escalator with the following degrees: information, communication, consultation, codetermination, and control. This escalator of participation illustrates various degrees of employee participation, which indicate the extent to which employees are able to influence the decision-making process (Wilkinson et al., 2010)

In addition, the term “participation” is often used as synonymous with “involvement” or “empowerment.” According to Ives and Olson (1984, p. 587), user involvement in system development refers to “participation in the system development process by representatives of the target user group.” This definition provides two dimensions of user involvement. The first dimension pertains to activities for examining users’ attitudes and system use, such as involvement in steering committees and project teams. The second dimension relates to participation throughout the system development life cycle. Barki and Hartwick (1989) define user participation as “a set of behaviors or activities performed by users in the system development process” and user involvement as “a subjective psychological state reflecting the importance and personal relevance of a system to the user.” Empowerment as a management approach serves to encourage innovative behavior among employees by providing information about goals and performance, offering rewards based on performance, providing access to job-related skills and knowledge, and granting discretion to change work processes through employee participation (Fernandez & Moldogaziev, 2013).

User participation in system development should incorporate participation as a multi-dimensional concept that recognizes the potential of participation contingencies, incorporates dynamics of the user-participation process, and remains aware of factors moderating the effect of participation on system success (Cavaye, 1995). According to Cavaye (1995), participation contingencies refer to the contextual aspects of system development that enable or hinder user participation, such as financial resources and willingness to participate. Cavaye (1995) asserts

that is essential for users to exert influence during the development process to achieve effective user participation.

User participation in system development primarily focuses on the participation of hands-on users to achieve a successful system. This pattern is well-known and commonly used in participatory design (PD) research. However, researchers on user participation recommend clarifying the concept of “user” before selecting participants. According to a review by Muneera and Didar (2015), the identification of the right type of user is an important factor in effectively managing user participation. The authors identified three user types: primary users (or hands-on users), who use the system frequently; secondary users, who use the system occasionally; and tertiary users, who are affected by the introduction of the system. Following Markus and Mao (2004), participation in information-system research should clarify the importance of affected stakeholders, especially “change agents.” The authors describe stakeholders as “those who are affected by a solution” and participants as “a subset of stakeholders who are actually given the chance to participate in solution development and/or implementation activities” and Change agents are “people who play important roles in designing and executing participation opportunities for stakeholders.” Stakeholders according to this this definition can have different statuses and IT skills and can be members of different stakeholder groups. Likewise, various members can exercise the role of change agent (e.g., managers, IS professionals, HR professionals, external consultants). Furthermore, Markus and Mao (2004) argue that participatory activities differ in terms of richness and outcome. The richness of participatory activities refers in this context to the extent to which participants experience them as personally meaningful and consequential. These activities are elaborated into solution design, solution implementation or change management, and project-management participatory activities. For instance, participatory activities in system requirements are more strongly related to system-quality outcomes than system-adoption and system-use outcomes (Markus & Mao, 2004).

#### 2.4.2. Employee Participation in IT Projects in the Public Sector

Prior research into employee participation in public-sector IT (or e-government) projects has discussed the motives, benefits, goals, and outcomes of employee participation, especially in terms of system success. For instance, Rao Baliwada and Jayaram (2014) evaluated, with a focus on PD, the effectiveness of employee participation on the implementation of an e-government project; they recommended investigating the participation of employees in the IT project life cycle in the public sector. Karlsson, Holgersson, Söderström, and Hedström (2012)

analyzed the usefulness of existing user-participation approaches, such as PD, in meeting the strategic e-services goals in the public sector. Likewise, Oostveen & Van den Besselaar (2005) combined PD with other methods to effectively involve employees as end-users in e-government projects.

Employee participation can play a key role in adopting change in the public sector and should become an integral part of the work process (O'Brien, 2002). The benefits associated with public-sector employees' participation include the creation of the conditions necessary for employees to make effective contributions to their organizations (O'Brien, 2002). Public-sector employees should participate in the digitalization process, as they are usually highly skilled with detailed knowledge of the business process and the ability to accurately categorize the work (Dečman, 2007). By exploring user-participation practices in public e-service development, Holgersson, Melin, Lindgren, and Axelsson (2018) identified how user participation is addressed in this context. They found that user participation in IT projects has been treated in veneered or ad-hoc manners. Veneered participation refers to participation without any context-specific considerations; ad-hoc participation refers to participatory activities without any directions or goals. Holgersson et al. (2018) challenged the overly positive effect of user participation on such projects, ultimately recommending that researchers investigate the effect of user participation in IT projects on their adoption of IT. Furthermore, as mentioned in Section 1.2, there is an explicit need for structured participation guides and instructions for user-participation activities in e-government projects (Følstad et al., 2004). Additionally, there is a need for deeper research into how users should participate in public-sector IT projects and the causality between user participation and IT adoption (Axelsson et al., 2013; Holgersson et al., 2018).

With this dissertation, I aim to fill this gap in the research by analyzing the role of employees' participation in IT projects in the public sector in their adoption of IT and by exploring fundamental aspects that help to integrate employees' participation within IT Projects in this sector. The following section provides an overview of my research design and methodology applied to achieve this purpose. .

### 3. Research Design and Methodology

This section details this dissertation’s overall research design and methods.

Due to the rapid evolution of IT in organizations, research often faces the challenge of existing theories and findings being unable to explain a phenomenon of interest; a mixed research study is appropriate for dealing with such situations, as it provides mechanisms through which to make contributions to theory and practice (Venkatesh, Brown, & Bala, 2013). Thus, this dissertation employs a mixed research approach, using literature reviews, qualitative and quantitative methods, interviews, and surveys (see Table 2), which are briefly described in the following subsections.

Table 2 Research design and methods used in each research study

Mixed Research Design	Method used	Publications
Literature review	Structured literature review	P1, P7
	Hermeneutic literature review	P5
Qualitative approach	Semi-structured interviews	P3, P4, P6, P7
Quantitative approach	Survey via online-questionnaire	P2, P4

The mixed research approach can serve various purposes, including complementarity, completeness, development, expansion, corroboration, compensation, and diversity (Viswanath Venkatesh et al., 2013). The design of this dissertation largely follows a developmental direction, using a qualitative study (P3) to explore and develop its hypothesis and a quantitative study (P4) to test this hypothesis. In addition to the developmental purpose, the mixed research design also serves the purpose of complementarity approach, where a qualitative study (e.g. P6) is conducted to gain additional insights on the findings from a quantitative study (e.g. P4).

Six studies (P1, P2, P3, P4, P6, and P7) were conducted to answer the first sub-research question (RQ1): “*What role does participation have in employees’ adoption of IT in the public sector?*” The first two studies, presented in my first and seventh publications (P1 and P7), were conducted using a systematic literature review in line with vom Brocke et al. (2009). In addition to the structured literature review (SLR), P7 used semi-structured interviews to explore employees’ understanding of digitalization in the public sector. These studies aimed to identify

the state of research on digitalization and IT adoption in the public sector and understand the factors that influence employees' adoption of IT. The study in P2 investigated participation in the introduction of the e-file in German federal administrations using a survey-based research study, aiming to gain insights into the practice of employees' participation in the IT-implementation process in the public sector. After identifying the current state of theory and practice, the study in P3 used qualitative data gained from interviews with German public-sector employees at various hierarchical levels to assess their experiences with the introduction of the e-file. This study aimed to assess the role of employee participation in their adoption of the e-file. Based on the results of P3, another study was conducted using semi-structured interviews (P6) to investigate the role of managers in this context. The findings of these studies aided in exploring potential relationships between participation and adoption and in developing the hypothesis of this dissertation. The empirical evidence behind this hypothesis was then tested using a quantitative, survey-based research study (quantitative study in P4) with data from a questionnaire. For the data analysis in this study, I employed SPSS Statistics and performed a correlation analysis, a regression analysis, and an ANOVA test, which are detailed in Section 9.5.1.

After identifying the role of participation in public-sector employees' adoption of IT and, in turn, answering RQ1, I aimed to identify fundamental aspects that help to integrate public-sector employees' participation opportunities in IT projects. Two studies were conducted (P4 and P5) to achieve this goal and answer the second sub-research question (RQ2): *“How can participation opportunities be integrated into IT projects to increase the adoption of IT in the public sector?”*

The study in P5 used a hermeneutic framework (detailed in Section 10.3) to provide an overview of possible opportunities for participation in the IT-introduction process. In addition to these identified participation opportunities, the qualitative study in P4 used expert interviews to explore fundamental aspects of integrating employee participation within IT projects in the public sector.

### 3.1. Literature Review

Literature reviews are important basics in each research, as they provide an overview, synthesis, and critical assessment of previous research and help to identify gaps in the literature and the needs of future research (Boell & Cecez-Kecmanovic, 2015). They represent a foundational component of research works (vom Brocke et al., 2009).

## *Systematic Literature Review*

As already noted, the first research study of this dissertation conducted a systematic literature review, a “standardized method” for literature reviews that is replicable, transparent, objective, unbiased, and rigorous; this method entails processes of searching, selecting, validating, and summarizing studies (Boell & Cecez-Kecmanovic, 2015). A structured literature review in IS research entails descriptions of the search details and explanations to ensure the search’s comprehensiveness (Okoli, 2015). I opted for a review process based on the literature review framework outlined by vom Brocke et al. (2009) (see Figure 4).

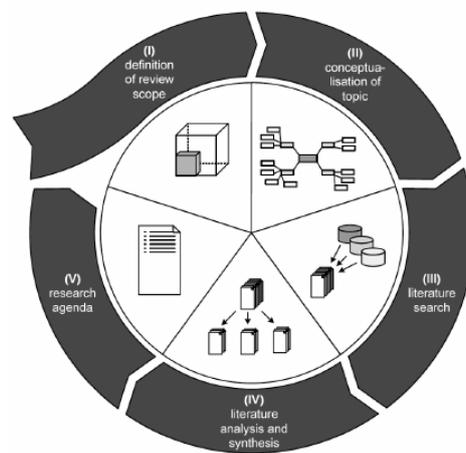


Figure 4 Framework for literature reviews (vom Brocke et al., 2009)

According to this framework, the literature search process requires the identification of high-quality papers (from leading IS journals and conferences) using keywords, which must be precisely documented, and the evaluation of their applicability. This framework entails a forward and backward search, which aids in identifying further works (additional sources that have cited the article or sources cited in the identified articles). After identifying the relevant literature in phase III, the framework recommends analyzing and synthesizing the literature in phase IV with the help of a concept matrix, which, according to Webster and Watson (2002), structures topic-related concepts into different units of analysis and allows for the arrangement, discussion, and synthesis of previous research (vom Brocke et al., 2009). Finally, this synthesis results in a research agenda (phase V), as a basic future research for the community.

## *Hermeneutic Literature Review*

P5 employed a hermeneutic review process, which differs from other literature reviews in its approach. It follows a process of the creation of interpretative understanding (Boell & Cecez-Kecmanovic, 2010), meaning that the understanding of each paper is interpreted in the context of all other considered papers. The hermeneutic review is an iterative process consisting of two major circles (see Figure 5): the search-and-acquisition circle and the analysis-and-interpretation circle.

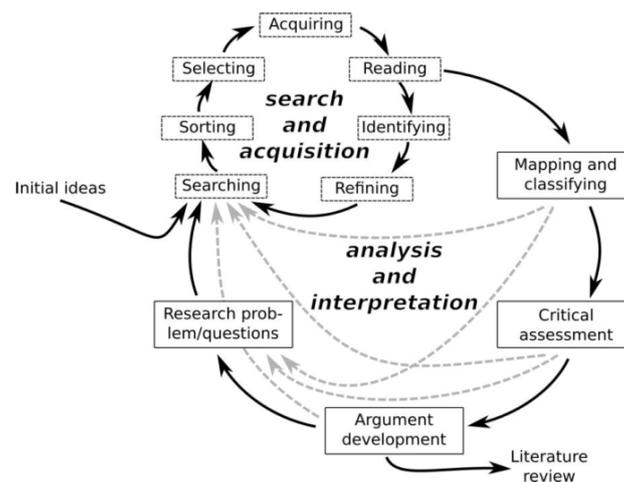


Figure 5 The hermeneutic literature review framework (Boell & Cecez-Kecmanovic, 2014)

According to Boell & Cecez-Kecmanovic (2014), the review process begins with the development of an initial idea or research question into the search-and-acquisition circle. The searching activities aim to identify relevant publications. Following a search, the identified works can be sorted using, for instance, their publication dates or relevance ranking to select works worth acquiring and reading. After reading the acquired publications, the reviewer starts to develop an understanding of the phenomena of interest and, in turn, identifies new literature sources and refines the search strategy accordingly.

The reading activities link both circles and help to map and classify the results. Mapping and classifying the identified elements serve to systematize and present them in an appropriate, compact form that describes the major findings. These findings can be critically assessed within the body of knowledge, which enables new iterations of the search-and-acquisition circle and the development of research questions. The iterative process of the hermeneutic framework should end when the majority of central publications that address the research gap are identified (Boell & Cecez-Kecmanovic, 2014). I opted for a hermeneutic review process in P5 because

the study's purpose is conceptual and aimed at identifying opportunities for participation in IT projects from different approaches and thus includes additional literature in the review process, only if they have enriched the previous existing knowledge and reported on additional user-participation approaches, practices or methods.

### 3.2. Qualitative Interviews

The qualitative approach is well-established in information-system research (Myers & Newman, 2007). It is used in natural environments and interprets phenomena based on participants' subjective answers to questions (Alvesson & Sköldbberg, 2018). Qualitative interviews constitute the most common and one of the most important data-collection methods in qualitative research (Myers & Newman, 2007). Interviews should always be recorded to provide a full description of given responses (Myers & Newman, 2007). Conducting qualitative interviews requires careful planning and preparation, the selection and accessibility of interviewees, and the analysis of interview data (Qu & Dumay, 2011). There are several types of qualitative interviews, including structured, unstructured, and semi-structured interviews. The flexibility, accessibility, and intelligibility of semi-structured interviews make them popular and the most effective and convenient means of gathering information (Qu & Dumay, 2011). The approach is suitable for studying many management and organizational issues, such as employee motivation and dysfunctional behavior (Qu & Dumay, 2011). Four of this dissertation's studies (P3, P4, P6, and P7) employed semi-structured interviews.

A semi-structured interview entails the preparation of questions beforehand in an incomplete guideline. The interview guideline is usually based on themes identified from the literature or other sources and serves to direct the interview toward topics of interest (Qu & Dumay, 2011). It is incomplete in the sense that the researcher or interviewer leaves room for improvisation (Myers & Newman, 2007) and can modify the style, pace, and order of the questions to ensure the direction of the conversation (Qu & Dumay, 2011).

Qu & Dumay (2011) recommend using different types of questions in the interview guideline in line with the following topology. First, introducing questions as "small talk" helps to kickstart the conversation, establish a rapport, and build trust; follow-up questions can then direct questioning to what was just discussed. For example, repeating significant words and asking "Could you say something more about that?" prior to posing direct questions can garner both general statements and direct responses. Direct questions should be followed by indirect questions to give the interviewee the opportunity to elaborate on further aspects that are

important to them. To move from one part of an interview to another, structured questions using key statements such as “I would now like to introduce another topic” help to indicate when a theme is exhausted by breaking off long, irrelevant answers. This should be followed by brief silence to allow for pauses between themes. Interpretive questions such as “You mean that [...]?” are important, as they help to clarify and interpret information during the interview. Furthermore, throwaway questions such as “Oh, I forgot to ask you [...]” can help in situations when sensitive areas have been touched on and the atmosphere needs to be relaxed.

The analysis of the interview data (transcripts) follows a qualitative content analysis in line with Mayring (2000), who defines the content-analysis process as “an approach of empirical, methodologically controlled analysis of texts within their context of communication, following content analytical rules and step by step models, without rash quantification.” The process follows a number of structured steps to meet reliability and validity criteria. It provides two procedures for the development of a category scheme to analyze the data: inductive and deductive category development. In the inductive approach, the categories are developed step by step from the material (transcript text) based on previously formulated criteria. In the deductive approach, the text is coded according to previously formulated, theory-driven categories. Burla et al. (2008) recommend that researchers work in teams to increase comprehensibility, support inter-subjectivity, and provide a sound interpretation of the data.

A mixed approach with both theory-driven and empirical categories is usually recommended and followed in P3, P4, P6, and P7. To ensure the inter-coder reliability and subjectivity of the data analysis, the coding in these studies was conducted separately by at least two researchers and then compared and evaluated in teams.

### 3.3. Quantitative Approach Using Survey Research

While qualitative research is concerned with the subjective interpretation of phenomena, quantitative research is more objective. A quantitative approach can be defined as “one in which the investigator primarily uses postpositive claims for developing knowledge (i.e., cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistics data” (Creswell, 2003, p. 20). It is a deductive approach that narrows down plausible causes to a discrete set of variables, aims to justify theories or test hypotheses, and helps researchers make

inferences or generalize their findings (Borrego, Douglas, & Amelink, 2009). One of the most commonly used quantitative methods is survey research.

Survey research is appropriate when current or past phenomena of interest must be studied in their natural setting (Kraemer, 1993). In addition, survey research revolves around the questions “What is happening?” “How?” and “Why?” It aims to generalize findings from a sample to a population and can be conducted with cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection (Creswell & Plano Clark, 2007). Kraemer (1993) differentiated between conducting a survey for data collection and conducting a survey as a research method. He defined a survey as a means of “gathering information about the characteristics, actions, or opinions of a large group of people, referred to as population” and described survey research as a method of advancing scientific knowledge. Researchers use survey research analysis to either investigate relationships between variables or project their findings descriptively on a predefined population (Kraemer, 1993).

Descriptive statistics are suitable in survey research for analyzing relatively unknown; it uses percentages to describe the situation without addressing any relationships between variables or groups (Borrego et al., 2009). Conducting survey research serves also to investigate relationships among variables or among groups. In doing so, hypotheses are formulated based on the research question, usually arising from professional experiences, previous research, and existing theories to describe potential relationships between variables that are to be tested (Black, 1999). Hypotheses define these variables and specify relationships that must be investigated (Black, 1999). Afterward, data is collected and analyzed to accept or reject the hypothesis and answer the research question (Borrego et al., 2009). Black (1999) recommends ensuring that the hypothesis logically follows the research questions, the sample is representative and consistent with the hypothesis, and the measuring instruments are appropriate for the identified variables and the intended statistical tests. Statistical tests, such as Pearson’s correlation, t-tests, and ANOVAs, have been used in countless studies to determine whether there is a significant relationship between indicators or whether the mean score of one group differs significantly from that of another (Borrego et al., 2009).

This dissertation pursues both purposes. P2 employs survey research with descriptive analysis to identify the current state of public sector employees’ participation in the introduction of the e-file in German federal administrations. P4 employs survey research to test the hypothesis of this dissertation and provide empirical evidence of the relationship between participation and

adoption. I performed correlation analysis using Pearson’s correlation coefficient and regression analysis to identify the coefficient of determination, R<sup>2</sup>. Pearson’s correlation coefficient measures the strength of the correlation between two variables; the coefficient of determination, R<sup>2</sup>, measures the proportion of variation in the dependent variable explained by the independent variables (Hinton, Brownlow, & McMurray, 2014). ANOVA tests were also used for data analysis in P4 to examine differences between groups. Survey research requires the collection of standardized information through the use of questionnaires or structured interviews (Kraemer, 1993). Both P2 and P4 used online questionnaires for data collection.

*Tools for supporting data analysis*

In addition, I used several tools to support the data-analysis process in my studies, as illustrated in Table 3.

Table 3 Tools supporting the data-analysis process in each study

Tool	Research study	Purpose
MAXQDA	P1, P3, and P4	For the content analysis and data coding
Excel	P1	For recording data
	P2	For the descriptive data analysis
	P5	For structuring the findings
F4	P3, P4, P6, and P7	For transcribing the interviews
QCA Map	P6, P7	For coding the interviews
SPSS	P4	For statistical tests

## 4. Research Results

This section presents the results of my research and includes two main parts. The first part aims to answer the first sub-research question (RQ1): “*What role does participation have in employees’ adoption of IT in the public sector?*” It includes the main contributions of six research studies (P1, P2, P3, P4, P6, and P7). The second part includes the fundamental aspects identified in two research studies (P4 and P5), which help to integrate employees’ participation opportunities in IT projects in the public sector. This part answers the second sub-research question (RQ2): “*How can participation opportunities be integrated into IT projects to increase the adoption of IT in the public sector?*”

Each part discusses how the methods mentioned in Section 3 were applied, presents the results of each study, and discusses the overall findings with regard to the dissertation’s research questions.

### 4.1. The Role of Employees Participation in IT Projects in the Public Sector in Their Adoption of IT

The main purpose of this dissertation is to identify the role of participation in public-sector employees’ adoption of IT. To achieve this purpose, the first step was, on the one hand, to identify how public-sector employees understand digitalization and the changes brought about by this process and, on the other hand, to develop an in-depth understanding of the factors that influence their adoption of IT and the ways in which participation is addressed. The second step was to focus on identifying how employees in the public sector participate in IT projects in the practice by investigating employees’ participation in the introduction of the e-file in German public administrations. The next step was to assess the role of participation in employees’ adoption of IT in the public sector and identifies in this study employees participation activities exercised along the introduction of e-file in German public administrations, which help increasing their adoption of this system. This research helped to explore the hypothesis of this dissertation in a qualitative manner by incorporating different employees’ personal experiences into this area’s existing body of knowledge. Finally, this research entailed empirical tests to gather empirical evidence of the relationship between public-sector employees’ participation in IT projects and their adoption of IT.

#### 4.1.1. Understanding Digitalization and the Factors that Influence Public-Sector Employees' Adoption of IT

Digitalization in the public sector is a phenomenon that can refer in theory and practice to many different concepts and terms, such as e-government, digital government, and digital transformation. While some researchers understand digitalization as the ongoing adoption of digital technologies across human and societal activities and its consequences (e.g., Ogonek & Hofmann, 2018), others understand it as the use of ICT to promote efficient administration, provide convenient public services, and overcome a lack of manpower (Chiang & Hsieh, 2007) or as the transparency of governmental work to citizens (Orita, 2005). Some researchers view digitalization as synonymous with e-government. For example, Finger and Pécoud (2003, p. 3) suggest that “most of what has been labelled e-government so far is in fact not much else than the ‘digitalisation’ of the State’s operational functions.” Others use the terms “e-government” and “digital government” to describe the use of ICT in the public sector (e.g., Bélanger et al., 2012; Chun et al., 2010).

The term “digitalization” appears to be understood and used differently in the public sector. It is generally unclear what the term refers to in this sector. Thus, it is necessary not only to understand the factors that lead to IT adoption, but also to understand what this phenomenon refers to in the public sector. Thus, this study investigates how digitalization is defined in the public sector from employees’ perspective and in the scientific discourse.

##### *Method*

This study P7 conducted semi-structured interviews with 16 public-sector employees to explore how they define digitalization. The participants were employees at federal, state, or local public administrations in Germany, some with and some without managerial responsibilities. The aim of the interviews was to explore the employees’ understanding of “digitalization” and the ways in which it impacts their everyday work life. The interview transcripts were analyzed using an inductive approach in line with Mayring and Fenzl (2019). In addition, this study used an SLR to identify how digitalization is defined in the scientific discourse. The extension with SLR served, on the one hand, to provide an in-depth analysis of the state of the art in defining digitalization in the public sector and, on the other hand, to compare these findings with the empirical results from the interviews.

As established in Section 3.1, to identify definitions of “digitalization” in the literature, I conducted a structured literature search in line with vom Brocke et al. (2009) and searched for

papers containing the term “digitalization” or its spelling variants - “digitization,” “digitalisation,” and “digitisation” - in the eight leading journals and high-quality conference proceedings in the IS and e-government area, as illustrated in Table 4.

Table 4 Searched Journals and Conference Proceedings as mentioned in P7

Journal/conference proceeding	Accessibility
Government Information Quarterly (GIQ)	2000-2002; 2013-2020
International Journal of Electronic Government Research (IJEGR)	2005-2018
Information Polity (IP)	1996-2019
International Journal of Public Administration in the Digital Age (IJPADA)	2014-2015
Transforming Government: People, Process and Policy (TGPPP)	2007-2019
Electronic Government, an International Journal (EG)	2004-2019
Journal of Information Technology and Politics (JITP)	
The Electronic Journal of e-Government (EJEG)	2003-2018
EGOV-CeDEM-ePart Proceedings [merge of the IFIP WG 8.5 Electronic Government (EGOV), the IFIP WG 8.5 IFIP Electronic Participation (ePart) and the Proceedings of the Conference for E-Democracy and Open Government Conference (CeDEM)]	2002-2018
Proceedings of the Annual International Conference on Digital Government Research (dg.o)	2000-2018
Proceedings of the Hawaii International Conference on System Sciences (HICSS)	1994-2018

I applied the search to the full text of the articles and identified articles based on titles, keywords, abstracts, and other sections. In total, I identified 269 articles containing the search terms. Only 10 articles explicitly reported on definitions and were included in the review.

### *Results*

The identified definitions from the literature review and the interviews are presented in Section 12.3. The results indicate a lack of common understanding of the term “digitalization.” Digitalization is a commonly used and investigated phenomenon in scientific discourse. However, the results indicate that the term is seldom explicitly defined. Public-sector employees’ understanding of digitalization is far from homogeneous. In comparing the results, I come out with eight themes related to the definition of “digitalization” from research and practice.

In defining digitalization, researchers and public-sector employees present the following themes: transformation of analog to digital, use of ICT, consequences and implications, vehicle for modernization, process transformation and automation, and digitalization as a process. In

addition to the common themes identified in definitions from the literature and interviews, public-sector employees define digitalization as technical infrastructure while the literature defines it as a sociotechnical phenomenon.

Transformation from analog to digital pertains to the electronic conversion of data into digital formats. For instance, one interviewee defined digitalization as "...the conversion of analog formats into digital signals..."; according to Busch, Henriksen, and Sæbø (2018), digitalization is a "technical process of encoding analog data or information and of converting it into a digital format." Furthermore, digitalization is often described as the use of ICT through various devices, such as computers or smartphones. For instance, Meijer (2007) refers to digitalization as "the use of information and communication technologies (ICTs) by government organizations to execute their business and management processes." While researchers define "digitalization" with sociotechnical associations, German public-sector employees focus more on the technical infrastructure in terms of broadband expansion. Most definitions from the literature and the interviews associate digitalization with its implications across various contexts, such as a paperless office, mobile work, information accessibility, and efficient work. Viewing digitalization as a vehicle for modernization results in the term carrying a future-oriented perspective. For instance, Paulin (2018, p. 3) refers to digitalization as "a welcomed tool to demonstrate modernization through technology, [...] introducing technology to modernize the way business is conducted."(Paulin, 2018)(Paulin, 2018) One interviewee defined digitalization as "progress, future-oriented, modernization." Further definitions understand digitalization as the transformation and automation of processes. This theme entails internal changes in government processes, especially those related to paperless workflows and electronically editing, forwarding, and storing data. One interviewee stated, "something like processing, forwarding, storage of transactions, information in electronic form." However, this theme also entails external changes, such as service provision, and changes that affect a process chain or all of society. Digitalization is also viewed as an ongoing process - as the "phenomena and processes of adopting and using these technologies" (Ogonek & Hofmann, 2018).

As mentioned in Section 2, despite the success of IT projects in the public sector strongly depending on the adoption of the introduced system by employees, employees' adoption of IT is rarely addressed in e-government research. The factors that influence public-sector employees' adoption of IT remain unclear. Since the public and private sectors differ significantly, especially in terms of legal constraints, staff characteristics, and structure (Boyne,

2002; Cinar, Trott, & Simms, 2019), it is essential to focus specifically on public-sector employees' perspective.

In order to identify the factors that influence public-sector employees' adoption of IT, I performed a structured literature review that provides an overview of the current research in the field, analyzes the identified factors, explores gaps in the literature, and outlines the needs of future research.

### *Method*

The general process of conducting a structured literature review was detailed in Section 3.1. To identify the relevant literature in this field, I conducted a structured literature search in line with vom Brocke et al. (2009) and searched using the keywords presented in Table 5 (both in combination and using single terms) between June 1st, 2017 and November 30th, 2017 for publications in leading IS journals and conferences, including: Management Information Systems Quarterly (MISQ), Information Systems Research (ISR), Journal of Management Information System (JMIS), The Journal of Strategic Information Systems, European Journal of Information Systems (EJIS), ACM Transactions on Information Systems, Information & Management, Proceedings of the European Conference on Information Systems (ECIS), Proceedings of the Hawaii International Conference on System Sciences (HICSS), International Journal of Electronic Government Research (IJEGR), Government Information Quarterly (GIQ), Public Administration and Development, International Journal of Public Administration (IJPA), The American Review of Public Administration, and Journal of Public Administration Research and Theory (JPART).

Furthermore, I used Google Scholar and Web of Science to identify further relevant articles based on their citation index.

Table 5 Search words as applied in P1

Domain	Behavior	Environment	Stakeholder
information technology IT/ e-government/ e-governance	acceptance/ adoption/ readiness/ barriers/ resistance/ satisfaction/ motivation	public	user/ employee/ servant/ staff/ workers
software /applications/ systems/ e-file / Website e-procurement /internet/	attitude towards/ Behavior intention to use	Government	managers/ authority

After identifying articles based on their titles, abstracts, keywords, and other sections, I applied a forward search (see Section 3.1) and looked for further relevant articles, which were cited in the identified articles.

### *Results*

In total, I identified 28 relevant articles addressing factors that influence public-sector employees' adoption of IT. The analysis identified intertwined clusters of factors, which I presented in a taxonomy including technical, individual, managerial, organizational, trusts, environmental (social and external), and demographic factors.

Public-sector employees' adoption of IT is mainly influenced by factors related to technological aspects of the system, such as perceived usefulness (or performance expectancy in the case of the UTAUT), perceived ease of use (or effort expectancy in the case of the UTAUT), system quality, compatibility, and infrastructure. Individual factors include IT skills, self-efficacy, subjective norms, computer anxiety, resistance to change, and attitude toward IT. Articles dealing with employees as managers mainly investigated managerial factors, such as managers' perceptions of technology, attitudes toward IT (which can also be seen as an individual factor related to functionality as manager), and characteristics, including age, tenure, education, gender, views on innovation, and political orientation. At the organizational level, identified factors generally refer to organizational culture and climate, including internal corporate barriers such as hierarchical culture, bureaucracy, organizational goals, mission, visions, decision-making practices, and involvement (participation), and to managerial, environmental, trusts, and demographic characteristics, such as organization size. Environmental factors consist of social characteristics like social influence, image, and visibility as well external

environmental factors, such as the existence of trade unions and legal constraints. Trust is addressed, for example, in terms of transparency, trust in information and communication, and trust in data. Demographic factors include age, gender, and education. Finally, organizational factors include organization size and complexity.

A detailed overview of the identified factors is presented in Table 6

Table 6 Influencing factors of government employees' adoption of IT, as identified in P1

Characteristics	Factors
Technological	perceived usefulness, perceived ease of use, performance expectancy, effort expectancy, system quality, compatibility, data security, system integration, infrastructure support, and technical support
Individual	technological skills/ technical know-how/ IT-capability, self-efficacy, subjective norms, interpersonal influence, individual internal barriers (technical know-how, risk-oriented attitude), training, user expertise, attitude, perceived risk, computer anxiety, computer attitude, resistance to change, user satisfaction, job relevance, job satisfaction (attitude towards job), net benefits, relative advantages, knowledge of the benefits, personal innovativeness, responsibility, staff motivation and interest
Managerial	decision-making practices, interpersonal influence, public service commitment, organizational power, internal corporate barriers (tenure, Education), managers' personal characteristics , IT capability, training, Skills and competencies and supervisory leadership
Organizational	organization culture and climate, bureaucratic, public service commitment, mission, goal integration, organization culture and climate, organizational commitment, involvement (participation, commitment, responsibility), financial resources, political commitment, centralization, peer organization experience, economic health and complexity
Trust	Trust, trust on data, information quality, argument quality, source credibility, adaptability (transparency, trust)
Environmental	Social: social influence, image, visibility/observability External: external demands (urbanization, community wealth and population growth), the existence of Trade unions, legal framework, external barriers (costs of the implementation, missing acceptance of the suppliers and missing experience of the suppliers), Provider acceptance among local providers and legal framework
Demographic	gender, size, tenure and education

The in-depth qualitative analysis in this study helped to position participation as a factor that influences public-sector employees' IT adoption in the public sector. Participation is rarely investigated - only in one study), where it refers to participation activities in training courses. However, participation turns out to be a relevant factor that influences public-sector employees' adoption of IT. As a factor behind adoption, participation has only been theoretically explored - it has yet to be empirically validated.

These findings are in line with the research gap indicated in this dissertation. To address this gap, the next four studies investigate the public-sector employees' participation in IT projects in their adoption of IT by evaluating employee participation in the introduction of the e-file in German public administrations.

#### 4.1.2. Employees Participation in IT-Projects in the Public Sector in the Practice

After understanding the factors that influence public-sector employees' adoption of IT and identifying how participation is addressed in this context, this research study focuses on identifying how employees participate in IT projects in practice by using survey research to investigate the actual state of employee participation in the introduction of the e-file in German public administrations.

Various opportunities for employee participation exist in the literature, such as participation in training and qualification measures (Favero, Meier, & O'Toole, 2016; Horton, 2003a; Horton & Farnahm, 2003), participation through employee representatives, such as staff councils (Favero et al., 2016), and participation through the evaluation and testing of usability (de Róiste, 2013). The degree to which employees can influence the decision-making process in their organization depends on the extent of their participation in this process - whether they are informed of the change in advance, whether they can veto the change, whether employee feedback is considered, and whether there are other forms of participation, such as engaging in routine tasks, training, and evaluating expected performance (Dachler & Wilpert, 1978). The participation of all expected users is not possible; participation is usually limited to representatives, such as employees with professional skills and experiences (Bødker, Kensing, & Simonsen, 2004; Rasmussen, Christensen, Fjeldsted, & Hertzum, 2011). Regarding the usability of an IT product, end users can participate during and/or after the design and development process to test the product (de Róiste, 2013).

Despite the existing opportunities for participation in IT projects, no research has been conducted into public-sector employees' participation in the introduction of IT projects in the practice.

### *Method*

To collect data for this research study, I used a survey questionnaire distributed randomly to German federal administrations via e-mail between December 2016 and January 2017. Since German federal administrations are legally required to implement the e-file due to national legal requirements in §6 EGovG-Bund, participation in the introduction of the e-file in these administrations is a good case for this study. Access to the federal administrations was provided through a collaboration with the German Trade Union Confederation (DGB) and the German Association of Civil Servants (dbb), limiting the sample to staff councils as employee representatives.

The questionnaire consisted of two main parts. Following an introduction with a brief explanation of the e-file, the purpose of this study, and demographic questions, the questionnaire asked about the current state of the introduction of the e-file in the respondents' agency in terms of the project phase (initiation phase, sourcing phase, design and development phase, pilot and operation test phase, and operation phase). Depending on this state, there were questions about the respondents' participation in the introduction process and their assessment of available participation opportunities displayed using filters. For example, if a respondent indicated that the introduction was in the initiation phase, questions about testing participation would not be displayed, since testing activities take place in later project phases. The questionnaire mainly included closed-ended questions using the five-point Likert scale ranging from strongly agree to strongly disagree, though there were some open questions. In total, 128 participated in the survey, and 50 respondents completed the questionnaire (28% of the total survey). Those who completed the questionnaire were 72% male and 26% female.

### *Results*

The main purpose of this study was to identify how employees participate in the introduction of the e-file in German public administrations in the practice. The results indicate that public sector employees would like to participate in their agency's IT projects but participation is poorly integrated in practice.

According to the respondents, most agencies are already working with the e-file or are in the initiation phase of the introduction process. As presented in Figure 6, various departments are involved in the introduction of the e-file. The IT department commonly worked alone or in cooperation with other departments, such as the organizational department and human resources (HRM). The participation of other departments, such as the registry and the archive, was surprisingly low.

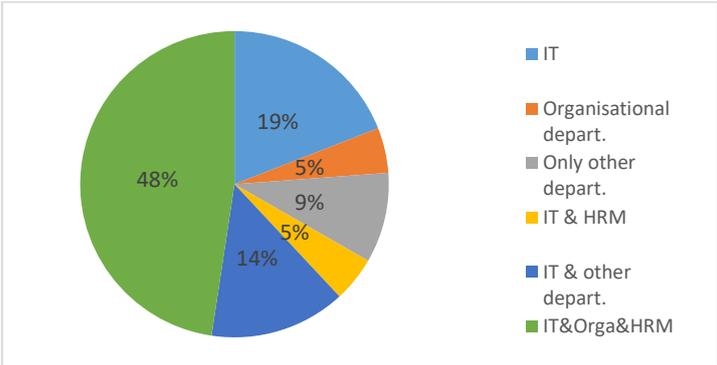


Figure 6 Departments participating in the introduction of the e-file in German federal administrations

The participants were also asked to assess their own (as employee representatives) participation opportunities at each stage of the e-file introduction of e-file as well as to assess the participation opportunities offered to the employees at their agency. Overall, the participation of both staff councils and employees was assessed, by more than 50% of respondents, as not appropriate. The staff councils assessed their own participation opportunities as less appropriate than those offered to the employees at their agency (see Figure 7).

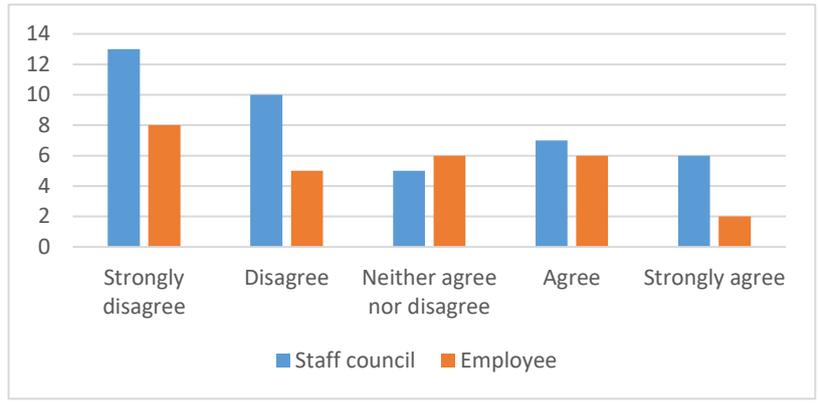


Figure 7 Assessment of the participation opportunities of staff councils and employees

The results indicate that most opportunities for participation occur in the both last phases of the introduction process (see Figure 8 and Figure 9).

The results indicate that most participation opportunities occur in the last two phases of the introduction process (see Figure 8 and Figure 9).

While employees are involved in both phases, staff councils are mainly involved in the pilot and operation test phase. For example, 80% (n=29) indicated that the staff council was informed of the status and progress of the test phase; nearly 60% indicated that they had received an evaluation report and obtained approval for pilot or regular operation. This is in contrast to the other phases, in which staff councils were less involved. In fact, staff councils were seemingly rarely involved in the sourcing and design and development phases.

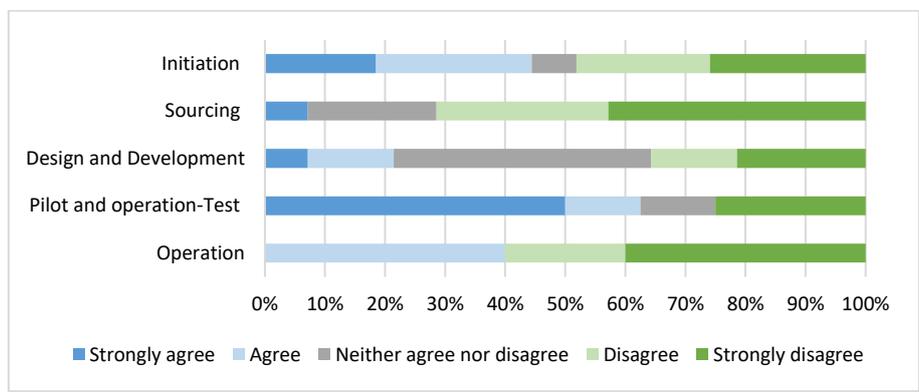


Figure 8 Assessment of the participation of staff councils in the introduction of the e-file

Even the employees were rarely involved in the early project phases, such as the initiation and sourcing phases. About 50% of the respondents (n=38) considered their own participation opportunities in the initiation phase of the introduction of e-file in their agencies for not be appropriate; more than 50% considered the participation opportunities of the employees in the initiation phase to also not be appropriate. Staff council opportunities for participation in this phase include receiving project-relevant information and providing representative members in project working groups. The most common participation opportunity for employees in this phase is the participation of employees with special skills. For the employees, there were hardly any institutionalized possibilities in this phase, which helps employees getting information about the introduction of the e-file, such as employee portals, wikis, or advisory units. Section 7 provides a detailed overview of the results of this study.

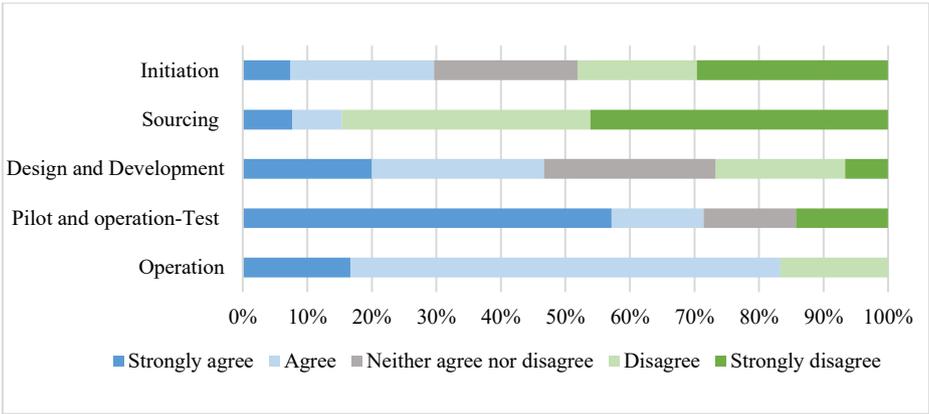


Figure 9 Assessment of the participation of employees in the introduction of the e-file

After identifying the current state of employee participation in the introduction of the e-file in German federal administrations, the next two studies investigate the influence of the employees’ participation in the introduction of the e-file on their adoption of this technology.

4.1.3. Assessing the Role of Employees Participation in IT-Projects in the Public Sector in Their Adoption of IT

This research study aimed to understand the role of employee participation in the introduction of the e-file in their adoption of this technology in order to explore potential relationships between public-sector employees’ participation in IT projects and their adoption of IT, building off the hypothesis of this dissertation.

## *Method*

Since this study is explorative, and qualitative research is infrequent in IT-adoption research, I veered from the traditional quantitative methodology standard in this type of study by adopting a qualitative research approach and relying on semi-structured interviews as the primary source of data. This study was conducted at the local government level in a German city-state through interviews with 11 employees working in various public administrations at different hierarchical levels (both managers and employees without managerial responsibilities). The interviewed project managers are responsible for the introduction of the e-file in the Office of the Senator of Finance, the Office of the Senator of Justice, the State Chancellery, and the Social Welfare Office, which collectively account for about 25,000 employees. Interviewees were asked about: demographic issues; the stage of the e-file introduction at their agency; their participation in the introduction of the e-file at their agency; the impact of participation on employees' adoption of the e-file; and further adoption factors beyond participation. The interviews took place in April 2018 with an average duration of about 30 minutes.

## *Results*

Findings from this study clearly support the idea that public-sector employees' participation in IT projects is related to their adoption of IT, indicating that participation has a positive effect on public sector employees' adoption of IT. The adoption of the e-file was reported as satisfactory, as employee participation was considered. For example, one interviewee stated, *"The more I'm involved in the run-up, the more I'll accept the system."* The results indicate different participatory activities exercised by the public-sector employees alongside the introduction of the e-file in terms of information and communication, training and support, active participation in project groups, and the formal participation of staff councils, which were proven to be successful and to increase the adoption of the e-file at their agencies. In addition, the results suggest that managers play an important role in propelling IT adoption in the public sector. However, barriers to participation, such as low resources and a lack of qualifications or willingness to participate, were also identified.

One simple and important way identified in this study to involve public-sector employees in IT projects is to inform them of the technology to be introduced and the challenges associated with it. For example, one interviewed project manager stated the following: *"One simple and effective way to achieve acceptance by our employees is to inform them about the new system and to communicate with them about it."* Measures applied in this context include presence on

the intranet, information events and workshops, and face-to-face communication, especially between employees and their line managers. Other important participatory activities explored in this study include customized training and individual support, even within one's own office and at one's own desk. One interviewee, for example, stated the following: *“Go into the offices, into the teams, and then ask something like: Where are the problems? Conduct more conversations, discuss problems, identify difficulties, proceed step-by-step and practice the processes together on their PC.”* Furthermore, active participation in “on-site” project groups was identified as an important participatory activity that reacts to individual needs, transmits information between steering committees and sub-stakeholders, involves employees in decision-making processes, advises employees, and works to solve problems on site. In addition, the results indicate the importance of the formal participation of staff councils as employees' representative bodies. Staff councils should take part in important decisions and relay employees' concerns throughout the introduction process. Another aspect explored within the interviews that extended beyond participation was the exchange of experiences between governmental departments and agencies and its impact on the adoption and success of IT projects. The identified framework of participation encompasses not only promising participatory activities but also barriers impeding this process. The interviewees reported on the lack of resources, qualifications, and willingness to participate. For example, one interviewee noted, *“It is not easy to find people who are willing to do this and who are able to do it too.”*

The results indicate that the role of managers in the public sector is a factor that influences employees' adoption of IT. Public-sector managers should make clear announcements about their expectations regarding the use of IT, apply management measures to ensure the use of IT by their subordinates, and act as a role model with a positive attitude toward IT. One interviewee said the following: *“The more positive the team leader's attitude toward the e-file, the more positive is the development of the e-files and all around it. That is just how it is.”*

The results are summarized in the framework presented in Figure 12; they are presented in detail in Section 8.4.

#### 4.1.4. The Role of Public Sector Managers in Their Employees' Adoption of IT

##### *Method*

To better understand the identified role of managers in public-sector employees' adoption of IT, I conducted 16 interviews with employees and managers at German public administrations

between March 2018 and June 2018. The interview guidelines mainly included questions about the managers' influence on their subordinates' use of IT, role-model function and management measures within IT projects as well as about the participants' attitudes toward IT, IT skills, and use of IT in their everyday work life.

I analyzed the transcripts through qualitative content analysis using deductive categories in line with Krippendorff (2004). The categories mainly included the assessment of the digitalization status within each interviewee's own institution, the interviewees' personal attitudes, IT skills, and use of IT in everyday work life, and the naming and evaluation of the management measures used.

## *Results*

### *Employees and Managers Attitudes Toward IT, IT-Skills, and Use of IT*

The results indicate that the attitudes of employees and managers toward IT, their IT skills, and their use of IT were distinct. While most interviewees assessed their own personal attitudes as positive, they assessed the attitudes of their counterparts far more critically and negatively. This negative perception was often related to general reservations about change and age differences between colleagues. One interviewee stated the following: *"I know the reasons that are negative. The age structures in the administrations, also in our administration, are such that there are a lot of young people and many who will retire in the next three to five years. What is missing are middle-aged people. And many older colleagues simply don't feel like changing their habits, they simply say, 'I don't want this anymore. I do not want that, it is enough for me as it is.' And that's where the negative touch comes from."* Similar to the assessment of the attitudes toward IT, most interviewees assessed their IT skills far more positively than those of their counterparts. The results suggest that managers should also attend training courses to improve their own IT skills. In contrast, the assessment of the use of IT was described as comprehensive in everyday professional life, even for colleagues and superiors.

### *The Role of Managers as Role Models and in Using Management Measures*

The majority of the interviewees asserted that managers should act as role models to increase IT adoption among their subordinates, arguing that managers' personal attitudes toward IT and usage of IT impact the willingness of employees to use IT: *"I believe that the motivation increases when the superiors also use digital instruments"; "We expect that managers actively use IT"; "So I think that managers have to live this out in a certain way."* While many interviewed employees discussed their expectations regarding managers serving as a role

model, managers perceive themselves as already fulfilling that role: *“The role-model function is just there, and if you then have people who understand it, who inspire others for whatever tools, or those who somehow show the positive benefits, then that’s very important. The role model is very important.”* In addition, the results show that managers should use management measures to reduce resistance to IT-related changes in their organizations. Interviewees argued that managers should inform employees about the introduction of IT and actively communicate with them (preferably in a face-to-face manner) regarding IT-related decisions. One interviewee stated the following: *“Informing the employees on time - I would find it important that if they have more information that they are allowed to pass on, that they will do this timely. Maybe in a staff meeting, which we have once a month, that they will say then, ‘We have received information that the e-file will probably be here in half a year, just so that you know.’ I mean that the superiors pass on the information to us that [is] approved on time.”* Many interviewees’ managers viewed motivation, for example, in terms of demonstrating the benefits of use as an important measure, which helps employees to actively use IT in their everyday work lives: *“I am actually referring to the successes they achieve with IT.”* Employees in the counterpart reported a lack of support from their managers during the digitalization process. One interviewee stated the following: *“There should be, in addition to productive IT, something like an IT control. That is someone who looks from above on the institution, on the structure, on the system [...]. These are all very important decisions - precisely because a lot is changing; there must actually be someone who is also at the very top of the house, who also has equivalent powers and competencies to make such decisions. But no one thinks like that here [...] and the managers have no awareness of what’s needed. They are dealing with completely different things.”* Another important management measure identified in this study is adequate participation. One interviewee stated the following: *“That’s why we organize several presentation meetings where experts always participate who try to explain their needs prior to these presentations, and then to find that their needs are considered in these presentations and the selection of the respective IT. Well, when it is about software, [the selection] also takes place with the affected persons - never without them. And, since this is the case, they have a totally different relationship with their software and are typically happy with that.”* Managers assume the responsibility to involve employees in the IT-introduction process through several activities, such as feedback collection.

Based on the above-mentioned results in the previous studies, the following study investigates the empirical evidence regarding the influence of public-sector employees’ participation in IT projects on their adoption of IT and the role of managers in this context.

#### 4.1.5. Empirical Evidence of the Influence of Employees' Participation in IT Projects in the Public Sector on their Adoption of IT

The research model developed in this study is based on previous findings and supported by previous research. The model doesn't include the clear announcement of managers as potentially positively related to public-sector employees' IT adoption, as no findings from previous research were found to support this relationship.

Numerous studies have reported on the positive effect that information has on employees' acceptance of change and attitudes toward IT. For instance, Fernandez and Rainey (2006) explain that the dissemination of information on new programs sways employees and leads to successful implementation. Bhattacharjee (2006) identified a positive effect of informational messages with source credibility on potential users' attitude toward IT. According to the Diffusion of Innovation Theory (DOI), the provided information plays an important role in users' acceptance of IT (Rogers, 2003). Hence, I hypothesize:

H1: Information is positively related to attitude toward using IT

An individual's general willingness to adopt technology is positively related to the communication flow in public organizations (Melitski, Gavin, & Gavin, 2010). Räckers et al. (2013) found that communication has a significant influence on behavioral intention to use IT. Communication is considered to be an effective strategy to change the negative attitudes of potential users of an IT system (Aladwani, 2001). Therefore, I hypothesize:

H2: Communication is positively related to attitude toward using IT

Employee training has been found to be one of the most influential factors behind the intention to use e-procurement systems in the public sector (Singh & Punia, 2011). Training can be used to shape beliefs about IT, which provide the basis for attitude formation (Amoako-Gyampah & Salam, 2004a). In addition to the improvement of users' behavior and performance, the improvement of users' attitude toward using the system is an instrumental, positive outcome of user training (Galletta, Ahuja, Hartman, Teo, & Peace, 1995). Hung et al. (2009) empirically demonstrated that training for public sector employees significantly influences their attitudes toward using IT. Therefore, I hypothesize that:

H3: Training is positively related to attitude toward using IT

In addition to communication and training, support that facilitates system-friendly conditions has been identified as one of the most important factors behind users' adoption of IT (Seymour,

Makanya, & Berrangé, 2007). Ngai, Poon, and Chan (2007) show that technical support has a positive effect on attitudes toward using IT. Thus, I hypothesize:

H4: Support is positively related to attitude toward using IT

Active participation refers to active contributions to the change process (Dachler & Wilpert, 1978). Public-sector employees can actively participate in the IT-introduction process (e.g., by testing prototypes, assessing functionality, and assessing usability (Ben Rehouma, 2019). This kind of participation encourages employees to give feedback about the change during the implementation process (Fernandez, Rainey, & Rainey, 2017) and helps to reduce their resistance to change (Abramson & Lawrence, 2001). Therefore, I hypothesize:

H5: Active participation is positively related to attitude toward using IT

One of the most important forms of indirect participation is the participation of staff representatives, such as trade unions and staff councils (Horton, 2003a). Since the participation of all employees in the IT-introduction process is unfeasible, several studies (e.g., Ben Rehouma, 2018, 2020) agree about the importance of the formal participation of staff councils to ensure the transmission of staff interests and influence the decision-making process. Accordingly, I hypothesize:

H6: Formal participation is positively related to attitude toward using IT

The role of managers in change management in the public sector has been discussed in several studies (e.g., Amoako-Gyampah & Salam, 2004a; Fariborz, Damanpour, & Schneider, 2006b; Frank & Lewis, 2004). In this context, managers are supposed to be role models, using IT themselves and applying management measures such as communication and support to ensure the use of IT by their subordinates. Thus, I hypothesize:

H7: The exemplary function of a manager is positively related to attitude toward using IT

H8: Management measures are positively related to attitude toward using IT

In a voluntary-use context, there is a consensus in the literature on the positive relationship between attitude toward using IT and behavioral intention to use IT. This is not the case when the use of IT is obligatory. Therefore, I would like to investigate this relationship in an obligatory-use context and follow studies (e.g., Räckers et al., 2013; Shen & Chuang, 2010), that describe using IT as a predictor of behavioral intention to use IT. Therefore, I propose:

H9: Attitude toward using IT is positively related to behavioral intention to use IT

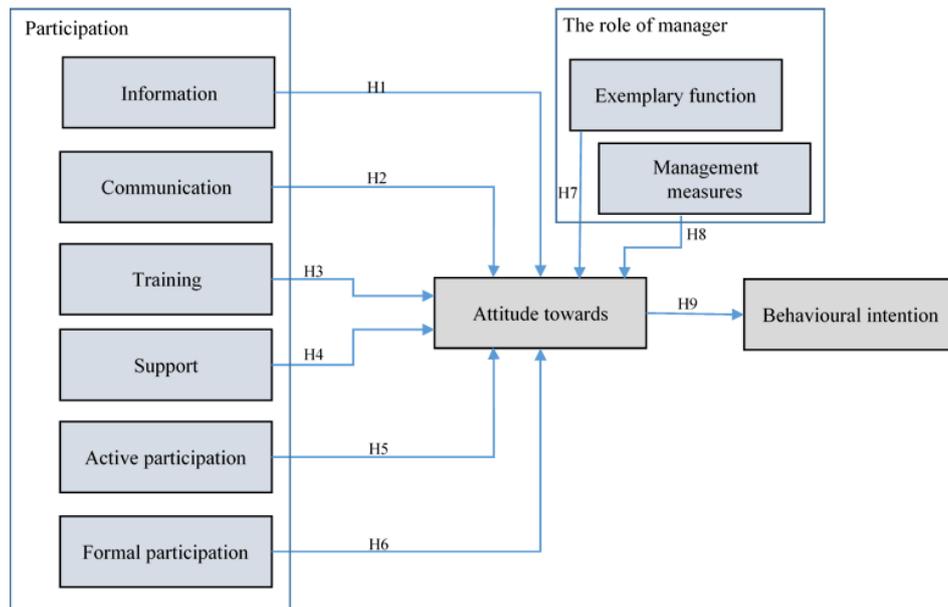


Figure 10 Research model, as presented in P4

### Method

In order to test these hypotheses, I applied a quantitative approach, collecting data through questionnaires from a local government administration in Germany. The questionnaires were randomly distributed via e-mail between February 5th and March 15th, 2019 after having been pre-tested and analyzed for reliability (see Section 9.6.1). Attitude toward using IT was measured through a self-evaluation of the own attitude towards using IT (0=negative; 1=neutral; 2=positive). Behavioral intention was measured by participants' degree of readiness to use new IT applications (0=not ready; 1=partly ready; 2=fully ready). All independent variables were measured using items with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In addition, to those items related to the hypothesis the participants were also asked to assess the existing opportunities in their administration, whether participation is important to them, and whether they would like to participate in future IT projects.

The data was analyzed using a correlation analysis based on Pearson as well as a regression analysis to identify the coefficient of determination  $R^2$ . Pearson's correlation coefficient measures the strength of the correlation between two variables while the coefficient of determination,  $R^2$ , measures the proportion of variation in the dependent variable explained by the independent variables (Hinton et al., 2014). This study also used a univariate ANOVA test

to assess the differences between groups with positive, neutral, and negative attitudes toward using IT.

Table 7 Items in this study's questionnaire

Variable	Survey Item
Information (Inf) Inf1 Inf2 Inf3	I was informed about the introduction of new IT I received newsletters on the new IT I received instructions regarding the new IT
Communication (Comm) Comm1 Comm2	The introduction of IT is communicated in my office There is a contact person for communication in my office
Training (Train) Train1 Train2 Train3	I received standard training I received advanced training I received customized training
Support (Supp) Supp1 Supp2	I received support for solving my problem with IT I received support in my own desk
Active Participation (ActivePart) ActivePart1 ActivePart2 ActivePart3 ActivePart4 ActivePart5 ActivePart6	I participated in project groups I participated in survey procedures I participated in design activities I participated in testing prototypes I participated in evaluating the system I participates in feedback activities
Formal Participation FormalPart1 FormalPart2	I received information about the system from the staff council I gave feedback about the system to the staff council
Management Measures ManagMeas1 ManagMeas2	My supervisor motivate me for using IT My supervisor support me in using IT
Exemplary function	My supervisor is for me a role model in dealing with IT
Attitude towards	My attitude towards using IT Positive, neutral, negative
Behavioural intentions	I intent to use IT Usually, sometimes, never

*Sample Reliability and Factor Analysis*

I used Cronbach's alpha ( $\alpha$ ) to ensure the internal consistency of the constructs and varimax rotation matrix for factor analysis to ensure convergent validity. Table 8 presents the reliability of all considered variables. According to Hinton et al. (2014), a reliability value of 0.90 or above is considered to be excellent, one between 0.70 and 0.90 is considered to be high, and one between 0.50 and 0.70 is considered to be moderate. As shown, all of the variables demonstrate high or excellent reliability aside from communication, which demonstrates a moderate

reliability value of 0.55. The variables - exemplary function of manager, attitudes toward using IT, and behavioral intentions - were measured using a single item.

*Table 8 Results of the reliability analysis*

Variable	Number of items	Cronbach's Alpha ( $\alpha$ )	Sample (n)
Information	3	0.74	78
Communication	2	0.55	78
Training	3	0.76	78
Support	2	0.90	78
Active participation	6	0.87	78
Formal participation of the staff council	2	0.69	78
Management measures	2	0.86	78
Exemplary function	1	-	78
Attitude towards	1	-	78
Behavioural intentions	1	-	78

For a factor analysis, a Kaiser-Meyer-Olkin (KMO) value of 0.60 or greater is sufficient according to Kaiser and Rice (1974). The results in Table 9 show that the values are significant with a KMO and Bartlett's test value of .786, which is adequate for a factor analysis.

*Table 9 Results of the KMO test and Bartlett's test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.786
Bartlett's Test of Sphericity	Approx. Chi-Square	1227.004
	Df	325
	Sig.	.000

Table 10 presents the results of the rotated factor loadings using a varimax rotation with Kaiser normalization and an eigenvalue larger than 1. The matrix extracted seven factors and showed how the items load on each factor, including factors with correlations of 0.3 or less. According to the results of the factor loadings, two items were excluded from the survey due to their low value.

Table 10 Results of factor loading using varimax with Kaiser normalization

	Components						
	1	2	3	4	5	6	7
ActivPart1	0.799						
ActivPart2	0.832						
ActivPart3	0.807						
ActivPart4	0.844						
ActivPart5	0.809						
ActivPart6	0.786						
Inf1	0.323	0.732	0.302				
Inf2		0.624					
Inf3		0.747		0.323			
Com1			0.690		-0.326		
Com2			0.665				
ManagMeas1							0.870
ManagMeas2							0.877
Exemplary function							0.867
Train1				0.755			
Train2				0.767			
Train3	0.440			0.650			
FomalPart1					0.868		
FomalPart2					0.844		
Supp1						0.707	
Supp2	0.375	0.327				0.521	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.\*

\*. The Rotation converged in 6 iterations.

### Results

In total, 99 public sector employees participated in this study, and 78 completed the questionnaire. The large majority of the respondents (88%) consider the participation of employees in IT projects to be important; 65% would like to participate in future IT projects. While 83% of respondents stated that they feel sufficiently informed about the introduction of IT projects at their agency, 78% indicated that the introduction of new IT applications is communicated well, 61% have participated in customized training courses, and 73% stated that they have received support at their workplace, only 25% of the respondents were actively involved in IT projects.

While approximately 69% of the respondents considered it important for the staff council to be involved as an employee representative in meetings of the project group, 75% claimed to have not received any information from the staff council regarding the introduction of IT applications. Concerning the role of managers, about 69% of respondents feel motivated by

their managers to use new IT applications, 60% stated that they have received support from their managers with using new IT applications, and 48% of respondents confirmed the exemplary function of their managers.

The analysis identified a significant relationship between the variables in all hypotheses except H6 (see Table 11).

Table 11 Pearson’s correlation and linear regression analysis of the constructs in H1–H9, as presented in P4

Hypothesis	H1	H2	H3	H4	H5	H6	H7	H8	H9
Pearson	0.329**	0.399**	0.266*	0.401**	0.354**	0.068	0.306**	0.290*	0.644**
R <sup>2</sup>	0.108	0.159	0.071	0.175	0.126	0.005	0.094	0.084	0.415

\*\*p<0.01 \*p<0.05

Table 11 shows the Pearson’s correlation coefficient and the coefficient of determination, R<sup>2</sup>, of the variables investigated in this study. Overall, the correlation analysis indicates highly significant relationships and moderate positive correlations between the variables in H1–H9 except for those in H6. The coefficient of determination, R<sup>2</sup>, indicates that all participation constructs aside from the formal participation of staff councils have a significant linear relationship with attitude toward IT. Based on R<sup>2</sup>, I can explain about 7.1% to 17.5% of the variance in the dependent variable, attitude towards using IT (except in H6). The role of managers similarly indicates a significant, linear, and positive relationship with attitude toward using IT.

However, the participation of the staff council does not indicate any significant relationship with employees’ attitude toward using IT. In addition, the results indicate that, even in a voluntary environment, employees’ attitude toward IT has a significant linear relationship with their behavioral intention to use IT.

In addition, using the univariate ANOVA test, the analysis identified significant differences for all variables (information, p=0.015; communication, p=0.0004; support, p=0.01; active participation, p=0.006; exemplary function of managers, p=0.03; management measures, p=0.02) between groups with a negative attitude toward using IT and groups with a positive attitude toward using IT. Therefore, I can only confirm H1, H2, H3, H4, H5, H7, H8, and H9.

## 4.2. Discussion and Positioning

In order to identify and understand the role of public-sector employees' participation in IT projects in their adoption of IT, six studies were conducted. The first two studies (P1 and P7) identified the ways in which public-sector employees understand digitalization and the factors that influence their adoption of IT. The results of P7 indicate that digitalization in the public sector is far from a uniform concept. The identified themes associated with digitalization indicate that, despite being widely used, the term is understood in various ways. While some understand digitalization as the use of IT in the workplace, others relate it to IT's consequences and implications for their routine work processes. The plethora of synonyms and related concepts in the literature, such as e-government, digital government, and digital transformation, clearly underlines the need to explicitly define the phenomenon when investigating digitalization in the public sector. Although digitalization is supposed to be a part of public-sector employees' everyday lives, their resistance and lack of a common understanding of digitalization constitute major barriers hindering the progress of digitalization in the public sector (Basyal & Seo, 2017). The structured literature review (P1) identified the state of the art in factors that influence public-sector employees' adoption of IT and ways in which participation addressed in this context. The review identified that employee participation in IT projects is a potential adoption factor in the public sector; this finding warrants attention in future research. The results of this review reveal that public-sector employees' adoption of IT is underrepresented in e-government research. Most studies are based on traditional theories and models of IT adoption, such as the TAM and the UTAUT, and, in turn, inevitably focus on standard factors (most within a technical context) in predicting the use of IT in the public sector. The analysis recognizes a taxonomy of factors within the public-sector context, including technical, individual, managerial, organizational, trusts, environmental (social and external), and demographic factors. Previous studies have emphasized the peculiarities of public-sector organizations on the individual, organizational, managerial, environmental, and trust levels. For example, relative to private-sector employees, public-sector employees are more risk-averse (Hartog, Ferrer-i-Carbonell, & Jonker, 2002a), work under greater pressure to perform, deal with less-integrated information systems, and operate under more fiscal and legal constraints (Reid et al., 2008). On the managerial level, public-sector managers' ability to inform and convince their employees of the introduction of a change is a major factor in successful implementation (Fernandez & Rainey, 2006). Public-sector managers often lack experience in digitalization projects and, in turn, are equally challenged by digitalization requirements

(Eggers & Hollmann, 2018). Thus, researchers reason that managers should work toward improving both their own IT skills and those of their subordinates (Leitner & Kreuzeder, 2005). As there is no generic IT-adoption research model (Willem, Vos, & Buelens, 2007) - and based on the analysis of public-sector peculiarities - I propose the following model, which includes the identified taxonomy as the main antecedents of public-sector employees' IT adoption.

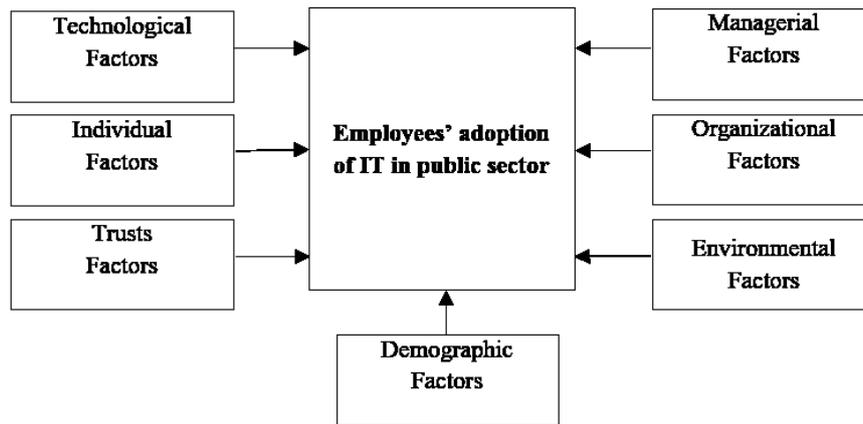


Figure 11 Public-sector employees' IT adoption: A conceptual model

Focusing on employee participation in IT projects as a potential adoption factor in the public sector, my studies have empirically confirmed this relationship. Answering the first sub-research question (RQ1) - *“What role does participation have in employees' adoption of IT in the public sector?”* - this dissertation identified that public-sector employees' participation in IT projects must be more structured to achieve the desired adoption. The results of P2 indicate that, while employees and staff councils would like to participate, the offered participation opportunities from public administrations are inappropriate and should be optimized. Interestingly, employees and staff councils were involved in far more activities during later project phases. The formal participation opportunities offered to staff councils, which serve as representative bodies, were assessed far more critically than those offered to employees. P3 explored different participatory activities pertaining to information, communication, training, support, active participation in project groups, and the formal participation of staff councils as potential factors behind public-sector employees' adoption of IT. Based on linear regression analysis, P4 found that all of these participation activities, aside from the formal participation of staff councils, have a significant, linear, and positive relationship with employees' attitude

toward IT. In other words, public-sector employees' participation in IT projects significantly influences their adoption of IT. These findings are in line with those of previous studies (e.g., Hu, Clark, & Ma, 2003; Hung et al., 2009; Muneera & Didar, 2015). For example, Aladwani (2001) argues that one major strategy for overcoming users' negative attitudes toward a system is to inform them in advance of the system's planned introduction. In this context, I emphasize, in addition to formal information measures such as the arrangement of information events, the importance of active communication between line managers and their employees, especially through face-to-face interactions. Receiving information directly from management on new organizational developments is a major part of direct user participation (Cats-Baril, 2016). Effective communication about technology enables the exchange of information about its benefits, leading to trust and successful implementation (Amoako-Gyampah & Salam, 2004). The aim here is not only to communicate the advantages of digitalization but also to eliminate its negative implications, such as parallel operation and the feeling of strain as indicated in P2. Thus, involving employees in continual trainings activities helps them to better understand the technology being introduced. Prior research has demonstrated the positive effect of intensive training programs on users' intentions to use a system (Hu et al., 2003). I argue that training should be tailored to meet employees' individual needs and should take place shortly before the introduction of IT. Another important issue highlighted in my results is related to support activities. User support is a significant determinant of public-sector users' attitude toward a system (Hung et al., 2009). I believe that immediate support should be available to help reluctant employees with any problems that may arise in their own office or at their own desk. Furthermore, active participation in "on-site" project groups was identified as an important participation activity that influences public-sector employees' IT adoption. Such participation methods are common, especially in participatory design (Kensing & Blomberg, 1998). The results of P3 indicate that active participation in on-site project groups aids in reacting to individual needs, transmitting information between steering committees and sub-stakeholders, and involving employees in decision-making processes. I found in P4 that, while information dissemination regarding IT projects is high among employees, the actual participation of employees in IT projects remains low (approximately 25%). However, the results also show that 88% of surveyed employees believe that participation is important to them; 65% declared that they would be willing to make use of participation opportunities. The explorative approach in P3 identified the formal participation of staff councils as a potential adoption factor in the public sector. Nevertheless, P4 did not produce statistical support for this relationship. This research found that formal participation in IT projects did not significantly explain employees'

adoption of IT. These findings could likely be explained by the lack of interaction between the staff council in terms of fewer activities provided from (to) the staff council in the participants' agencies. In P4, for example, 75% of participants claimed to have not received any information from the staff council on the introduction of IT applications. In addition, approximately 69% of the respondents consider it important for the staff council to be involved as a representative body in meetings of the project group. The results of P2 show that participation opportunities in IT projects given to staff councils in the public sector are not appropriate and must be optimized. Therefore - and based on previous studies supporting the importance of the participation of staff councils in IT projects (e.g., Horton & Farnahm, 2003; Rasmussen et al., 2011), I postulate that the participation of staff councils is a potentially important factor that influences public-sector employees' adoption of IT. This should be investigated more deeply in future research.

Another adoption factor identified in my studies - which, in fact, was found to be more important than employee participation - is the role of managers. The role of managers, in terms of their exemplary function, role-model status, and application of management measures, was empirically identified as an IT-adoption factor in the public sector (P3, P6, and P4). Previous studies on managerial factors in IT-adoption research have argued that managers' pro-innovation attitudes influence the adoption of innovation (e.g., Damanpour & Schneider, 2008; Koo, Wati, & Jung, 2011). Managers should involve employees in the change process (Fernandez et al., 2017), motivate employees to use digital technologies (Ragu-Nathan et al., 2004), communicate with them about changes (Amoako-Gyampah & Salam, 2004a), support them through changes (Lewis, Agarwal, & Sambamurthy, 2003), and serve as role models by using IT themselves (Van Wart, Roman, Wang, & Liu, 2017). My results clearly support these findings, demonstrating the need to actively serve as a role model and communicate with employees about IT-related changes in the public sector. The results of P2 demonstrate the importance of the ability to both communicate the benefits of new systems and address the perceived negative implications of IT-related changes.

In addition to the identified participation activities, barriers to participation and IT adoption in the public sector were identified. The lack of resources for managing participation in IT projects, the lack of qualifications, and the lack of willingness to participate were identified as major barriers to participation, hindering the success of IT implementation in the public sector. Hofmann (2014) reported on the negative effects of low personnel on IT changes in the public sector. Additional factors that result in public-sector limitations identified in previous research

include legal constraints, available resources and competencies (Holgersson et al., 2018), users' abilities and willingness to participate, and top-management awareness and support (Thakurta, 2017).

Below, I summarize the validated empirical findings regarding the influence of public-sector employees' participation in IT projects on their adoption of IT, postulating that:

- Participation in the form of information significantly and positively influences public-sector employees' adoption of IT. Information measures are not restricted to formal measures, such as information events and newsletters; they include face-to-face interactions between line managers and their employees.
- Participation in the form of communication - especially active communication between line managers and their employees - significantly and positively influences public-sector employees' adoption of IT.
- Participation in the form of training significantly and positively influences public-sector employees' adoption of IT. Training should be tailored to employees' individual needs and should take place shortly before the introduction of IT.
- Participation in the form of support significantly and positively influences public-sector employees' adoption of IT. This particularly applies to support for reluctant employees in their own office and at their own desk.
- Active participation in project groups significantly and positively influences public-sector employees' adoption of IT. This particularly applies to "on-site" project groups, which react to individual needs, transmit information between steering committees and sub-stakeholders, and involve employees in decision-making processes.
- The exemplary function of line managers significantly and positively influences public-sector employees' adoption of IT. Public-sector managers should act as role models by displaying a positive attitude toward IT and using IT themselves.
- Applying of management measures significantly and positively influences public-sector employees' adoption of IT. Public-sector managers should ensure the use of IT by their subordinates by providing communication, motivation, and support.

These main findings are presented in the following framework. Figure 12 presents the facilitators of and barriers to IT adoption among public-sector employees that participation presents as well as the role of managers in this context.

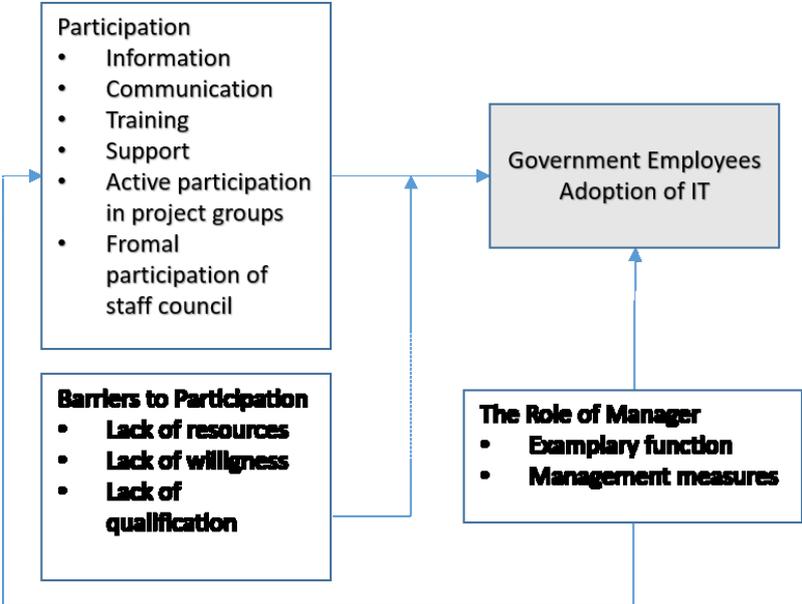


Figure 12 The role of public sector employees’ participation in IT projects in their adoption of IT

To fill the gap discussed in the problem statement (see Section 1.2), dissertation aims not only to identify the role of employees’ participation in IT projects in the public sector in their adoption of IT, but also to investigate how employees’ participation opportunities can be integrated within IT projects to increase the use of IT in the public sector. Therefore, this dissertation provides, in Section 4.3.1, guidelines with various opportunities for employee participation in the IT-introduction process in the public sector. Section 4.3.2 suggests the consideration of four key aspects, which aid in the successful integration of employees’ participation opportunities into public-sector IT projects.

4.3. Integrating Employees’ Participation Opportunities in Public-Sector IT Projects

My results have validated the positive influence of participation on public-sector employees’ adoption of IT. However, it is important to avoid ad-hoc participation and provide concrete advice in a formal manner in order to apply employee participation throughout the IT-introduction process (Holgerrsson et al., 2018). The public sector needs external experts to

explicate the importance of utilizing participation methods suited to the IT-development process (Følstad, Krogstie, Oppermann, & Svanaes, 2005). Researchers not only investigate how user participation should be applied but also treat it as a question of strategy that can be realized dynamically in different forms with available resources. Therefore, two studies (P4, and P5) were conducted to address this gap. The first study identified a guideline with different opportunities for public-sector employees' participation in the IT-introduction process; the second study identified key aspects for integrating employee participation into public-sector IT projects.

#### 4.3.1. Participation Opportunities within IT Projects in the Public Sector

This study used a hermeneutic literature review, as explained in Section 3.1, and searched between March 1st and May 31st, 2018 for works that detail opportunities for employee participation and methods from different approaches that can be used in the public-sector IT-introduction process. The search was conducted primarily in the “Scopus” and “Web of Science” databases using search streams along the lines of the following:

{(Participation) OR (Involvement)} AND {(User) OR (Employee) OR (Servant)} AND {(IT) OR (System) OR (Software) AND {(Public Sector) or (Government)}}

The identified articles were coded to content-related categories in line with Webster and Watson (2002), including “participation approach,” “practices of participation,” and “typically used methods.” The analysis and interpretation of findings were based on the mapping and classification of the identified practices and methods to activities in each phase of the IT-introduction process.

#### *Results*

The identified approaches addressing user participation in the literature included “participatory design,” “human-centered design,” “user-centered design,” “ethnography,” “contextual design,” “user innovation,” “lead users,” and “human resource management.” The results indicate several practices of participation and the typical methods used in each approach, which are summarized in Table 12.

Table 12 Overview of participation in the identified approaches, as presented in P5

Practices of Participation	Typical Methods Used
<b>PD</b>	
<ul style="list-style-type: none"> <li>• As advisors in specific design decisions</li> <li>• Assess prototypes developed by the system developers</li> <li>• As representatives in the form of selected small group of users who make design decisions</li> <li>• As members in project work groups and steering committees</li> <li>• In activities for analysis of needs and possibilities, formulating system requirements, evaluation of standard systems, selection of technology components, designing and prototyping of new technologies and in organizational implementation</li> </ul>	<p>Workshops, prototyping, visit of other work sites, courses, lectures, supervised project work, questionnaire, and interviews.</p>
<b>HCD and UCD</b>	
<ul style="list-style-type: none"> <li>• As advisors or representatives</li> <li>• In meetings with key stakeholders for usability planning and scoping</li> <li>• By task requirements</li> <li>• By iteration of design solutions</li> <li>• In multidisciplinary design teams</li> <li>• By understanding and specifying the context of use</li> <li>• By specifying the requirements</li> <li>• For the evaluation of the design against the requirements</li> </ul>	<p>Context of use analysis, survey of existing users, field studies, user observation, diary keeping, task analysis, user requirement interview, focus groups, scenarios of use, personas, existing system/competitor analysis, task/function mapping and allocation of function, brainstorming, storyboarding, card sorting, paper/software prototyping, participatory evaluation, evaluation workshops, evaluation walkthrough or discussion, assisted evaluation, controlled user testing, and satisfaction questionnaires</p>
<b>Ethnography</b>	
<ul style="list-style-type: none"> <li>• By developing shared views on the work</li> <li>• By requirement elicitation</li> <li>• By system design</li> </ul>	<p>Observation, interview and video analysis. Open-ended (contextual) interviews and (participant) observations, audio or video recordings</p>
<b>Contextual Design</b>	
<ul style="list-style-type: none"> <li>• By early design activities</li> <li>• By optimizing work processes</li> <li>• By providing input to the product definition process</li> </ul>	<p>Contextual inquiry such as observation and interview together, "MUST" method, field studies of work in combination with case-based prototyping</p>
<b>UI or Lead Users</b>	
<ul style="list-style-type: none"> <li>• By providing new ideas</li> <li>• By identifying problems and design solutions</li> <li>• As responsible for problems and solutions</li> <li>• By collaborating with developers</li> </ul>	<p>Initiation of the development of new products, improvement of existing products</p>

<b>HRM</b>	
<ul style="list-style-type: none"> <li>• By participative decision-making as source of power</li> <li>• By communication and knowledge transfer to coordinate and cooperate within the organization</li> </ul>	<p>Explicitly define job tasks, analyze training needs, provide adequate user training, and motivate potential users by establishing reward systems</p>

Looking for participation opportunities in the public-sector IT-introduction process, this study analyzed the activities in each project phase (i.e., the initiation phase, sourcing phase, design and development phase, pilot and operation test phase, and operation phase) in the context of the practices and methods in the approaches identified in Table 12. The results indicate that several participation opportunities, which are summarized in Table 13 exist throughout the IT-introduction process. More details on these results are provided in Section 10.5.

Table 13 Opportunities for participation in the introduction process of IT in the public sector, as presented in P5

<b>Activities</b>	<b>Opportunities for Participation</b>
<b>Participation in the Initiation and Planning Phase</b>	
<ul style="list-style-type: none"> <li>• Identifying of business needs</li> <li>• Identifying of stakeholders</li> <li>• Development of a project concept</li> <li>• Including costs and risks analysis</li> <li>• Planning of required resources and activities</li> <li>• Building project teams</li> </ul>	<ul style="list-style-type: none"> <li>• Lead users can initiate project initiatives by providing new ideas for the development of new products or improvement of existing products</li> <li>• Employees can participate in steering committees, as project leaders, as members of a project team and/or work groups, as advisors or representatives, and so are actively involved in different activities such as analysis of needs, project definition, and review of the project plan and further deliverables</li> <li>• Employees' information about the initiation of the project via e-Mails, information on internal webpages, newsletter, or arranged workshops</li> </ul>
<b>Participation in the Requirements Definition and Sourcing Phase</b>	
<ul style="list-style-type: none"> <li>• Elicitation of user requirements (requirements gathering and requirements analysis)</li> <li>• Development of user-training plans or concepts</li> <li>• Procurement procedures</li> <li>• Request for proposals</li> <li>• Vendor evaluation and selection</li> <li>• Contract documents/agreements</li> </ul>	<ul style="list-style-type: none"> <li>• In activities for analysis of needs and possibilities and for formulating system requirements</li> <li>• Provide information about the characteristics of the users, their tasks and their operating environment for requirement gathering</li> <li>• Provide input to the product definition process</li> <li>• As interview partner, member of focus groups, or for further methods within contextual design or ethnography</li> <li>• HR departments, user representatives in the work project groups as well as other members in the organization can participate for analyzing training</li> </ul>

	<p>needs, providing adequate user trainings according to these needs and evaluation of training concepts</p> <ul style="list-style-type: none"> <li>• Reviewing of the deliverables such as the requirement specification document and training manuals</li> <li>• User representatives such as employees with adequate skills and work councils participate by inspecting the proposals and contract documents and selecting the vendors.</li> </ul>
<b>Participation in the Design and Development Phase</b>	
<ul style="list-style-type: none"> <li>• The application system is designed and developed according to the requirement specification</li> <li>• The developed system is tested in a separate test environment</li> </ul>	<ul style="list-style-type: none"> <li>• Assess prototypes, early feedback about the design, the functionality as well as the usability of the system</li> <li>• The common methods used for those activities are interview, focus groups, scenarios of use, personas, existing system/competitor analysis, task/function mapping, allocation of function, and prototyping.</li> </ul>
<b>Participation in the Deployment and Operation-Test Phase</b>	
<ul style="list-style-type: none"> <li>• The system is integrated in a pilot production environment</li> <li>• Tests in a real environment with real users</li> <li>• Evaluating the system based on the defined requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Usability tests, card sorting, as well as questionnaires, observation and interviews are also suitable to get feedback from the end users about the developed system in this phase.</li> <li>• Employees can participate in training activities and evaluate the training concept for eventual concept improvement.</li> </ul>
<b>Participation in the Operation and Maintenance Phase</b>	
<ul style="list-style-type: none"> <li>• Rollout of the system</li> <li>• Ongoing system operation</li> <li>• Monitoring and evaluation of the system,</li> <li>• Installation of system modifications (updates/releases)</li> <li>• Maintenance of the system</li> </ul>	<ul style="list-style-type: none"> <li>• Feedback from the end-users in their routine work with the system with questionnaire, interviews as well as through communication with managers and work councils help the evaluation process for possible updates or maintenance.</li> <li>• Support during the system use (for any questions about the implemented system or help needed)</li> <li>• Knowledge sharing through communication</li> </ul>

After providing this overview of different opportunities for public-sector employees' participation in the IT-introduction process, expert interviews were used in the next study to explore key aspects, helping to integrate participation into public-sector IT projects

#### 4.3.2. Fundamental Aspects for Integrating Participation Opportunities into Public-Sector IT Projects

##### *Method*

For this part of my research, I conducted interviews with expert employees of federal government administrations in North Rhine-Westphalia between October 11th and November 18th, 2018. The interviews aimed to identify key aspects for integrating participation into

public-sector IT projects based on the participants' experiences regarding employee participation and project processes. The experts that participated in the interviews were individuals in decision-making positions (e.g., IT project managers, IT managers, project management staff, department heads). The interviews lasted from 45 to 60 minutes.

Table 14 Examples of questions used in the interview guideline of this study, as mentioned in P4

Goal	Example of questions
Gain insight into previous uses of employee participation methods.	Which forms of employee participation have you made use of in the past? Did you conduct a preselection? How was this selection performed?
Determine preferred methods on the basis of past experience	Given free reign, which methods of employee participation would you have chosen?
Inquiring the current status quo and procedures.	Which methods are used in regards to employee participation currently? How can these adoption-improving methods best be integrated into IT projects in the public sector?

### *Results*

The results confirm the findings of my previous studies, indicating that public-sector employees' participation has the potential to increase the adoption of IT solutions during their development and after their completion. The interviewees stated that the failure of several IT projects due to a lack of employee participation has led to the view that employee participation is critical. These findings are in line with those of P3.

The analysis of the interviews identified four key aspects to integrate employee participation in public-sector IT projects - (1) definition of a participation framework and suitable methods during the initiation phase; (2) selection criteria of employee participation methods; (3) utilization of established methods; and (4) establishment of an information-dissemination plan - which I recommend considering when implementing public-sector IT projects.

### *Definition of a participation framework and suitable methods during the initiation phase*

The experts recommended the definition of a participation framework during the early project phases to determine the extent and degree of participation. In addition, they recommended considering the efforts and pressure that can occur based on the choice of participation method.

Therefore, it is important to choose suitable participation methods during the early project phases based on available resources to avoid complaints during later project phases.

#### *Selection criteria of employee participation methods*

This key factor addresses the selection criteria for choosing the most suitable participation methods in line with the project's scope, the framework's conditions, and the targeted user group. The experts stated that each IT project is unique in terms of its scope and degree of standardization, explaining that there is no universally valid approach for employee participation. For example, standard IT projects, which are targeted at a large user group, often entail more participation, especially during later project phases, while tailored or smaller IT projects targeting a specific user group require more participation during early project phases. The experts recommend IT projects with a highly specific user system and low standardization to recruit a small group of end users with expertise and specific knowledge of the requirement-specification phase. This is in contrast to IT projects with a larger user segment and more standardization, for which it is useful to involve end users in later project phases, especially after the system requirements have already been fundamentally defined. For example, employees can provide feedback on a prototype using large-scale feedback-collection methods, such as online questionnaires.

#### *Utilization of established methods*

The experts indicated that the use of methods that have been successfully applied in past projects is another important factor that should be considered for participation in public-sector IT projects. They recommended, for example, the use of questionnaires to collect general feedback on the adoption of a project and the use of one-on-one interviews to collect more in-depth feedback and gain insights into employees' personal opinions, fears, and problems regarding a project. Regarding the active participation of employees in the IT-development phase, the experts recommended the use of workshops in which groups of employees can comment on, discuss, and provide feedback on the current project and test prototypes.

#### *Establishment of an information-dissemination plan*

The fourth key factor identified is the establishment of an information-dissemination plan. This policy should regulate both the information flow within the project team and the communication with involved employees outside of the project team. This policy aids in providing information about the project's status and results, avoiding confusion within the project team, reducing redundancies, creating transparency, and increasing the availability of information. The experts

recommended analyzing which stakeholders are affected by the project and the extent to which they are affected. In doing so, a project manager can establish group-specific policies that, for example, determine what information should be distributed at which intervals to whom.

#### 4.4. Discussion and Positioning

P4 and P5 sought to answer the second sub-research question (RQ2): “*How can participation opportunities be integrated into IT projects to increase the adoption of IT in the public sector?*”

The analysis identified a wide range of participation opportunities throughout the IT-introduction process, and its findings indicate a great potential for successfully integrating employee participation into public-sector IT projects by considering the fundamental aspects necessary to achieve the expected benefits. While common participation methods are those related to requirement definition and system design, P5 identified additional participation opportunities that can occur in earlier project phases, such as the analysis of needs and the review of the project plan, and opportunities that can occur throughout the whole process in terms of information, communication, training, and support. According to participation theory, project-management participation activities are mainly used during early project stages, such as the initiation phase, in contrast to solution-implementation activities, which are more common during later stages. Although the focus of user participation was largely discussed in terms of system design and development, several studies argued that involving users in the early stages is more effective, as they can influence subsequent stages (e.g., Muneera & Didar, 2015). Indeed, designing user participation with the goal of achieving system adoption differs from designing it to achieve productivity benefits. When user participation is treated with the primary aim of productivity benefits, its design focuses on providing developers with the necessary domain knowledge rather than inducing psychological involvement among potential users to achieve system adoption (He & King, 2008). In this context, participation also denotes the provision of information on the planned IT introduction, participation in training and support activities, and the representation of employees’ interests through staff councils.

Indeed, the results of P4 demonstrate the importance of precisely defining public-sector employees’ participation in IT projects during an early project phase to achieve the expected benefits. Such a framework aids in managing participation during all subsequent project phases by specifying the degree of participation. The experts in P4 recommended the selection of suitable participation methods in early project phases based on available resources. This aspect was also evident in P3 with regard to the lack of resources as a major barrier to participation

and one of the greatest challenges in planning participation in the public sector. Previous research has argued that, to effectively manage participation, it is important to provide time off from daily work, allow time for experimentation, relax deadlines (Kensing & Blomberg, 1998), and select the most appropriate participants from a group of stakeholder (Muneera & Didar, 2015).

Moreover, the analysis in P2 reveals that, despite the extensive pool of participation methods, the lack of management and knowledge concerning the methods used for participation in public-sector IT projects is one of the main reasons for the lack of employee participation in this sector. My findings support the utilization of established methods and indicate that the choice of employees' participation methods should align with the project's scope, the framework conditions, the targeted user group, the hierarchy level, and the employees' IT skills. Unclear user segments and a lack of adequate skills constitute major challenges that must be considered when choosing between different participation approaches in public administrations (Karlsson et al., 2012). This is in line with the findings of P3, indicating that it is not enough to participate since the required qualifications failed.

Another fundamental aspect identified in my results is the establishment of an information-dissemination plan. Such a plan can aid in creating transparency, detecting potential mistakes, and regulating communication and information flow between various stakeholders. This dissertation already validated the positive influence of information and communication on public-sector employees' adoption of IT. Based on these findings, I recommend a plan that focuses on adequate information and employs appropriate communication channels. The dissemination of critical information and the encouragement of employee feedback during implementation help to reduce employees' resistance to the change (Fernandez et al., 2017). According to the DOI (Rogers, 1995), the provided information, IT-relevant details, and employed communication channel all influence public-sector employees' IT adoption.

I strongly believe that change-management approaches based on employee participation must be adopted in the public sector to achieve the successful implementation and adoption of IT projects. Based on these findings, I recommend the consideration of the identified fundamental aspects: (1) definition of a participation framework and suitable methods during the initiation phase; (2) selection criteria of employee participation methods; (3) utilization of established methods; and (4) establishment of an information-dissemination plan. Furthermore, the identified participation opportunities effectively provide an overview of the wide range of

participation opportunities in each project phase; they can serve as a guideline for practitioners in the future.

## 5. Conclusion

Through seven studies (P1–P7), this dissertation aimed to identify how public-sector employees' participation in IT projects can contribute to their adoption of IT.

Six of the studies were conducted to answer the first research question (RQ1). The first step aimed to identify what employees understand with regard to digitalization in the public sector (P7) and to detail the state of the art in factors that influence employees' adoption of IT in e-government research (P1). Indeed, it is not only important to understand the factors that lead to IT adoption, as it is unclear what “digitalization” refers to from the employees' perspective. Thus, P7 identified that digitalization in the public sector is understood differently by different people. It revealed that it is necessary to explicitly define the term “digitalization” in both research and practice in order to avoid misinterpretation and achieve a common understanding. Furthermore, P1 indicated that employees' perspective is underrepresented in e-government research. Most studies in this area are based on traditional theories and models of IT adoption and focused on technological aspects. Participation was identified as a potential adoption factor that has yet to be empirically tested. In addition, participation in this context was solely related to participation in a training course and does not cover different forms of participation. The results of this study (P1) reveal that, in addition to technical factors, public-sector employees are influenced by individual, managerial, environmental, trusts, and demographic factors that should be considered when studying their perspective in IT-adoption research.

The third study (P2) conducted to answer the first sub-research question (RQ1) aimed to identify how participation in IT projects is applied in German public administrations. The results show that, although several opportunities for participation exist throughout the IT-introduction process, participation is poorly employed in practice. Neither employees nor staff councils were satisfied with the participation opportunities offered in their administrations. This was especially the case for participation opportunities in early project phases, such as the initiation and sourcing phases. While employees were more involved in the later project phases, such as the design and development phase, staff councils were mainly involved in the pilot and operation phase, as this phase entails a formal agreement from the staff council to move into the operation phase. This study revealed a high level of dissatisfaction with the participation

opportunities offered for employees - but especially for staff councils, which should be reinforced from the organization as well as actively communicated from employees and the staff councils themselves.

The results of P3, P6, and P4 indicate that public-sector employees' participation in terms of information, communication, training, support, and active participation in project groups as well as the role of managers significantly and positively influence employees' adoption of IT. The fourth study (P3) aimed to explore the role of employees' participation in IT projects in their adoption of IT. It found that IT projects failed in the public sector due to the underestimation of past adoption issues among employees. Indeed, public administrations are now far more aware of the importance of employee adoption and the role that participation plays in this context. Participation activities identified in this study include information, communication, training, support, active participation in project groups, the formal participation of the staff council, and the exchange of experiences between governmental agencies. Public administrations now try to inform employees of the introduction of new IT in their organizations earlier in order to keep them up to date via newsletters and informational events. Employees in the counterpart perceive their own participation as low and would like to be directly informed by their line managers of the introduction of IT and its associated challenges. The use of different communication channels to inform and communicate with each stakeholder group was recommended in P4's qualitative approach. Training is another identified participation activity that positively influences public-sector employees' adoption of IT. The results reveal that training should take place shortly before a system is incorporated into regular operations. Employees look beyond the standard two-day training courses (in this case, on the e-file) and for more advanced and tailored training courses. Additionally, individual support in one's own office and at one's own desk should help reluctant employees to deal with the introduction of IT. Furthermore, employees' active participation in project groups aids in transmitting employees' needs to steering committees, providing feedback on the system being introduced, and influencing the decision-making process. The results of P4's quantitative approach show that employee participation in terms of information, communication, training, support, and active participation as well as the role of managers have a significant and positive influence on public-sector employees' attitude toward using IT. The formal participation of staff councils as representative bodies is also explored as a potential influencing factor (P3). However, the results of the quantitative approach in P4 indicate no significant correlation between formal participation of staff councils and public-sector employees' attitude toward IT. The results of P2, P3, and P4 clearly show that employees consider their own participation as

well as the participation of staff councils to be important. Staff councils are institutionalized organizational members who can “formally” and “practically” influence the decision-making process. Therefore - and due to the previous results showing fewer participation opportunities for staff councils - I argue in this dissertation that the influence of the formal participation of staff councils on public-sector employees’ adoption of IT should be investigated more thoroughly in future research. Furthermore, the exchange of experiences between governmental agencies should help them learn from one another regarding the factors that influence the adoption and success of public-sector IT projects. This aspect was only explored as a potential factor in P3 and has not been empirically validated. It could also be investigated in future research. In addition, my findings in P3 and P6 reveal that the role of managers significantly influences public-sector employees’ adoption of IT. Managers serve an exemplary function and should act as role models by displaying a positive attitude toward IT and using IT themselves. Managers should be able to communicate with their subordinates about IT changes and offer relevant motivation and support.

To answer the sub-research question about how to integrate participation opportunities in public-sector IT projects in order to increase employees’ adoption of IT (RQ2), two studies were conducted (P4 and P5). The results indicate that there exists a wide range of opportunities for employee participation across the IT-introduction process. Since traditional participation methods center around methods used in PD or HCD, P5 investigated different participation practices using methods from different approaches, such as contextual design, and human resource management, showing that several additional opportunities exist in earlier project phases, that offer employees as well as staff councils more opportunities to be involved in this process. Nevertheless, managing participation remains challenging. In addition to the barriers to participation identified in P3, such as lack of resources, lack of qualifications, and lack of willingness to participate, P4 identified four key aspects - definition of a participation framework and suitable methods during the initiation phase; selection criteria of employee participation methods; utilization of established methods; and establishment of an information-dissemination plan - that should be considered to successfully integrate public-sector employees’ participation in IT projects.

To answer the overall research question (RQ) - *"How can participation contribute to employees’ adoption of IT in the public sector?"* - this dissertation derives several recommendations based on its findings that are in line with those of previous studies. The public sector should strategically integrate employee participation through change-management

approaches that consider the four above-mentioned key aspects, make use of participation opportunities in each project phase, especially the early ones, provide adequate support, recruit additional staff for managing IT projects, and cooperate far more with staff councils to better understand employees' needs and create more transparency regarding IT-related decision-making processes. A straightforward way identified in this dissertation to involve all employees in the IT-introduction process is to inform them of the planned change early on and not only communicate the benefits of the system, but also address its perceived implications. Furthermore, public administrations should provide further training and support to help employees deal with new systems at their workplaces. Managers should act as role models and demonstrate a positive attitude toward the use of IT in their institutions. They should motivate, support, and communicate with their employees to overcome reluctance and fear.

### 5.1. Theoretical Contribution

This dissertation makes a significant contribution to e-government and IT-adoption research with a focus on public-sector employees in several ways. First, the main implication of this research is the empirical evidence of the influence of public-sector employees' participation in IT projects on their adoption of IT. Employees' participation was statistically identified as a significant factor behind their attitude toward IT and, in turn, their use of IT. This dissertation explored specific participation activities in terms of information, communication, training, support, active participation, the formal participation of staff councils, and the exchange of experience through employees with different roles and at different hierarchical levels. It also identified the role of managers as another determinant of public-sector employees' adoption of IT in the public sector. This dissertation introduced a framework (see Figure 12) constructed from these findings with an all-encompassing view of the facilitators of and barriers to employee participation. The proposed framework's richness of including the facilitators and barriers that employees participation presents to the adoption of IT balances its constructs and has the potential to be empirically tested and refined to enable further research in this area with a contextual theoretical underpinning. This framework can be used for various organizational contexts in which researchers want to determine the influence of employee participation on the adoption of IT.

The in-depth and critical analysis from these findings provides valuable insights into how employee participation can improve the adoption of IT in government settings in developed

countries such as Germany. The findings presented in this dissertation are in line with previous research emphasizing change-management approaches based on participation in the public sector (e.g., O'Brien, 2002). They provide empirical evidence of the influence of public-sector employees' participation in IT projects on their adoption of IT. This dissertation explored several participation opportunities throughout the IT-introduction process and detailed the aspects necessary to successfully integrate these participation opportunities into change-management approaches in the public sector.

Furthermore, this dissertation constitutes one of the few studies to investigate the perspective of public-sector employees. Public-sector employees' adoption of IT is an under-researched topic in e-government as well as in IS and IT adoption research. This dissertation identified technical, individual, managerial, organizational, environmental, trusts, and demographic factors that influence public-sector employees' adoption of IT and proposed an IT-adoption model for public-sector employees (see Figure 11) that highlights the need to consider the identified factors. These factors constitute a significant contribution to this research field.

In addition, this dissertation emphasized that, despite digitalization being commonly discussed in research and in practice, there is no universal definition. This lack of a common understanding of digitalization constitutes a major barrier to public-sector innovation. Thus, another contribution of this dissertation is its emphasis on the need for both a greater understanding of digitalization in the public sector and an explicit definition of the phenomenon in order to avoid confusion and misinterpretation.

## 5.2. Practical Contribution

From a practical perspective, this dissertation produced several recommendations, especially for managers. The results demonstrate the benefits of involving employees in public-sector IT projects. Public administrations can improve strategic digitalization planning by considering employees' participation in IT projects and needs for IT adoption. In addition, public administrations can alleviate the challenges related to employee participation, which in turn affect the adoption of IT and so the success of digitalization in their organization by providing additional resources, such as training, human resources, and immediately accessible support. Additionally, employees and staff councils should appeal for more participation opportunities and actively communicate their needs instead of just reacting with dissatisfaction or resistance.

Public-sector managers can consider the identified fundamental aspects to successfully integrate employee participation in IT projects. The explored opportunities for participation (see Table 13) can serve as a guide for managers to select participation activities and methods for particular project phases. In addition, managers should recognize the influential role that they play in the process of digitalization and act as role models and key communicators.

### 5.3. Limitations and Future Research

This dissertation has several limitations. First, the research was conducted in German public administrations at the federal and local level, meaning the findings cannot be generalized to the entire public sector because public administrations differ greatly based on scale (i.e., federal, regional, or local), function (e.g., finance, real estate, law), and innovation culture (e.g., openness to innovation, initiative, individual leadership). In addition, this study focused on public-sector employees' participation by evaluating the introduction of the e-file as an example of public-sector IT projects. Future research could consider copious other IT projects in other countries and with more stakeholders, such as government policymakers. In addition, the results of this dissertation indicate that IT adoption stems from far more than technological aspects. In fact, this dissertation identified several factors beyond participation, its main investigated factor, that influence public-sector employees' adoption of IT. Nevertheless, as indicated in P1, research into public-sector employees' adoption of IT is very scarce. The studies that do exist largely focus on traditional theories and models of IT adoption, such as the TAM and the UTAUT, and, in turn, investigate largely technical factors, such as perceived usefulness and perceived ease of use. However, as identified in P1, public-sector employees are also affected by individual, managerial, organizational, environmental, trusts, and demographic aspects. IT adoption in the public sector is mandatory - not voluntary. As a result, this dissertation gathered opinions on an IT system that public-sector employees must use regardless of their feelings on the matter.

Furthermore, aspects beyond the identified participation activities, such as the exchange of experiences between governmental agencies and the identified barriers to employee participation, could not have been tested in this research due to the limited access given to the sample of this dissertation. The identification of barriers to employee participation constitutes a solid research foundation that can be elaborated to explain how these barriers could be overcome. The findings of this dissertation indicate that public-sector employees' participation should be carefully managed to increase the adoption and sustain the use of IT in the public

sector. The identified fundamental aspects for successfully integrating employee participation opportunities in public-sector IT projects were explored in a qualitative manner. Future research could elaborate on this to conceptualize the integration of participation within public-sector change-management approaches.

Part B - Papers of the Dissertation



## 6. Government Employees' Adoption of Information Technology – A Literature Review

<b>Title</b>	Government Employees' Adoption of Information Technology – A Literature Review
<b>Authors</b>	Mariem Ben Rehouma and Sara Hofmann
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<b>Publication status</b>	Published
<b>Reference in this document</b>	P1
<b>Abstract</b>	Information technology adoption in the public sector has attracted increasing attention. However, research has mainly focused on citizens' adoption of e-government services and neglected the internal perspective. Government employees' adoption of IT is a critical factor for the success of IT implementation in the public sector. In this paper, we therefore provide the current state of research in this field by conducting a literature review that examines factors influencing government employees' adoption of IT. We identified 28 articles dealing with this perspective. Our results reveal that other perspectives, which do not examine conventional models such as TAM or UTAUT with standard constructs, provide also interesting insights into IT-adoption in the public sector with identifying significant factors based on public sector specifics. These include technological, individual, organizational, managerial, environmental, trusts and demographic factors. We propose a comprehensive model for employees' IT adoption in the public sector, which considers these specifics, and recommend future research to examine its validity. Further research needs are summarized in our research agenda.
<b>Keywords</b>	Adoption, acceptance, e-government, employees, information technology, literature review, public sector



## **Government Employees' Adoption of Information Technology – A Literature Review**

### **6.1. Introduction**

The role of information technology (IT) in the public sector worldwide has grown enormously in recent decades and IT has become the standard for public transaction processes. Nevertheless, e-government services like e-files or e-procurement as well as special software for administrative procedures pose grand challenges for the majority of the public sector employees. Fears and anxiety border their perception of innovation and modernization (Schulz-Dieterich, 2016). Prior studies on individual innovation within the public sector report that employees in public organizations seem to perceive more barriers that limit their innovation work behavior (IWB) than employees in private sector organizations (Nijenhuis, 2015). The success of e-government is highly dependent on the employees' adoption. Researchers from various fields are concerned with the factors that influence user adoption of IT in the public sector. The majority of them, however, focuses on the business (G2B) or citizen (G2C) perspective. Only few researchers in the field of e-government adoption deal with the employees' perspective in the public sector (G2E). However, transferring findings from employee adoption studies in the private sector does not seem promising because private and public sector institutions differ to a large extent – on the one hand, on an organizational level (Boyne, 2002) and, on the other hand, regarding the employees' characteristics (Willem et al., 2007). Therefore, we see the necessity not only to understand general patterns of users' IT adoption but rather to investigate the peculiarities of the employees in the public sector in order to identify factors that influence their adoption of IT. With the aim of advancing the research field in this area, the questions guiding our research are: What is the current state of research in employees' adoption of IT in the public sector? Which factors influence government employees' adoption of IT? What are the needs for future research? In this paper, we particularly aim to provide an overview of the current research on government employees' IT adoption, analyze the factors that influence their IT adoption in detail, explore gaps and outline future research needs in this field.

In order to answer our research questions, we conducted an in-depth review of the literature dealing with government employees' IT adoption. We carried out a structured literature search followed by forward and backward search and analyzed the relevant literature with the help of a review framework. In total, we considered 28 articles within relevant IS, public administration and e-government journals.

Our review is structured as follows: In section 2, we give an overview of IT adoption, the relevant models and the situation in the public sector. Section 3 presents the approach of our literature review followed by the presentation of the results in section 4. The analysis of the findings is reported in section 5 and discussed in section 6, which includes our proposed research model and research agenda. Finally, we conclude our review and provide limitations in section 7.

## 6.2. Theoretical Background

### 6.2.1. Definition of IT Adoption

The adoption research in IT focuses on the analysis of factors that influence the adoption of a given system (Kollmann, 1998), on the willingness of users, especially employees, to benefit from the potentials of information processing, and on the degree of participation in the introduction of new technologies (Stahlknecht & Hasenkamp, 2002). One definition of IT adoption refers to the degree of willingness to use the possibilities offered by the information processing related to tasks at the workplace (Stahlknecht & Hasenkamp, 2002). According to (Dillon & Morris, 1996), the related term ‘user acceptance’ can be defined as “...the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support”. In the same context, the user acceptance of IT applications is described as a state illustrated by the adoption and the use of these applications, with changing characteristics and forms over time (Wilhelm, 2012).

Beyond these definitions, the terms “adoption” and “acceptance” are widely used as synonyms. A possible distinction in the literature refers to the frequency of using an information system. The term “adoption” refers to a user’s decision to use a system for the first time whereas the term “acceptance” refers to the post adoption stage (Hofmann et al., 2012). Further distinction is related to whether the use of the technology is voluntary or under mandatory conditions (Engelbert & Reis Graeml, 2014). In this context, a user adopts IT, only if he or she has options to decide to use this IT or not. Otherwise, he or she may accept it but not adopt it. We use the term “adoption” in the course of our paper, except when the term “acceptance” is explicitly mentioned in the relevant literature. Our analysis covers both terms “acceptance” and “adoption”. The following section gives an overview of the most widely used theories and models of IT adoption.

### 6.2.2. Theories and Models of IT Adoption

Research on individual IT adoption is mainly inspired by two theoretical perspectives (Bhattacharjee, 2006). The first perspective is based on individual perceptions that determines behavioral intention of the person's attitudes toward that behavior (Lai, 2017). According to (Ajzen, 1991), "attitude" is defined as the individual's evaluation of an object and "belief" as a link between an object and some attribute, and "behavior" is defined as a result or intention. These and related determinants are applied in the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) as well as the Technology Acceptance Model (TAM), the Decomposed Theory of Planned Behavior (DTPB), and the Unified Theory of Acceptance and Use of Technology (UTAUT). The second perspective is based on the Diffusion of Innovations Theory (DOI).

The Theory of Reasoned Action makes a clear difference between the behavioral intention and the behavior and discusses how the behavioral intention leads to actual behavior and depends on attitude and subjective norms. In addition to attitude towards a behavior and subjective norms, the Theory of Planned Behavior (TPB) is extended by the determinant "perceived behavioral control", influencing intention and behavior (Ajzen, 1991). The formation of a "behavioral intention" is the result of the combination of "attitude toward the behavior", "subjective norm", and "perceived behavioral control" (Ajzen, 2002). One of the adoption models of TRA that focuses especially on IT is the Technology Acceptance Model (TAM) developed by (Fred D Davis, 1986).

According to TAM, the decision whether a user actually uses a system or not is driven by his or her behavioral intention. An individual's behavioral intention depends on his or her attitude towards using this system, which in turn is a function of two cognitive beliefs: perceived usefulness and perceived ease of use. Perceived usefulness is defined as the potential user's subjective likelihood that the use of a certain system will improve his or her action whereas perceived ease of use refers to the degree to which the potential user expects the target system to be free from effort (Lai, 2017). Perceived usefulness directly influences the behavioral intention. External variables influence these beliefs and, thus, have an indirect effect on an individual's attitude towards using this system as well as his or her behavior (Fred D Davis, 1986).

The Unified Theory of Acceptance and Use of Technology (UTAUT) is based on four constructs: "performance expectancy", "effort expectancy", "social influence", and

”facilitating conditions“, as direct determinants of the “use behavior”. Performance expectancy and effort expectancy respectively capture the concepts of TAM, perceived usefulness and perceived ease of use. Social influence is defined as the degree to which an individual observes others' opinions about the use of a system and facilitating conditions refer to the degree to which individuals believe that organizational and technical infrastructure is in place to support the use of the system (Lai, 2017). Key moderators (gender, age, experience and voluntariness of use) indirectly influence usage intention and through those four constructs (Viswanath Venkatesh et al., 2003).

The second perspective deals with the mechanisms of spreading innovations and technologies from the Diffusion of Innovations Theory (DOI). According to (Rogers, 2003), diffusion is defined as “the process in which an innovation is communicated through certain channels over time among the members of a social system”. Four main elements influence the spread of a new idea: innovation, communication channels, time and social system. Based on this definition, the author discusses the diffusion process of an innovation, which consists of different stages: knowledge about the existence of the innovation, persuasion about the innovation, the decision to adopt or to reject the innovation and depending on this decision to implement (or not) the innovation and finally to adopt it (or not). “Perceived” characteristics of innovations can help to explain the different rate of adoption by different individuals. Those characteristics are relative advantage (the degree to which an innovation is perceived as better than the idea it supersedes), compatibility (the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters), complexity (the degree to which an innovation is perceived as difficult to understand and use), triability (the degree to which an innovation may be experimented with on a limited basis), and observability (the degree to which the results of an innovation are visible to others) (Rogers, 2003).

Two further, different approaches that are occasionally applied in adoption research are the IS success model by DeLone and McLean and the elaboration likelihood model. The DeLone and McLean’s IS success model consists of six dimensions that measure success: “systems quality” measures technical success, “information quality” measures semantic success, and “use, user satisfaction, individual impacts,” and “organizational impacts” measure effectiveness success (Delone & McLean, 2003). The elaboration likelihood model (ELM) posits two distinct routes for individual changes: a central route and a peripheral route. The ELM holds that there are numerous specific processes of change on the "elaboration continuum" ranging from low to high. When the operation processes at the low end of the continuum determine attitudes,

persuasion follows the peripheral route. Individuals are influenced through their motivation and ability to persuade in one route. The central route requires high elaboration, while individuals with less persuasion follow the peripheral route (Klimmt, 2011).

### 6.2.3. IT Adoption in the Public Sector

In the e-government context, an abundance of literature on the adoption of IT can be found. However, research mainly considers the interaction between government and citizens (G2C) and thus investigates citizens' adoption of e-government services. Most studies focus on a technological perspective and examine constructs such as perceived ease of use and perceived usefulness (e.g. (Alomari, 2014; Bélanger & Carter, 2008; Carter & Bélanger, 2005; Sipior et al., 2011; V Venkatesh et al., 2010; B. W. Wirtz, Mory, & Ullrich, 2012)). Other articles deal with the impact of trust on this relationship (e.g. (Sá, Rocha, & Pérez Cota, 2016; Seo & Bernsen, 2016)), or with privacy and security ((Al-Busaidy & Weerakkody, 2011; Reddick, 2005; Sang et al., 2009; Tolbert & Mosserberger, 2006)).

Another research stream revolves around the relationship between government and business (G2B). (Tung & Rieck, 2005) analyzed factors that influence firms' decision to adopt e-government services and revealed the impact of perceived benefits, external pressure and social influence. Further studies show the importance of government-provided information to the needs of business groups to effectively and efficiently work (Conroy & Evans-Cowley, 2005). Further studies discuss the governmental view of innovation and diffusion of information technology among governments. (Jun & Weare, 2011) examined institutional motivation for adoption and (Korteland & Bekkers, 2008) evaluated functional, political and institutional aspects that affect the diffusion of IT in governments. However, research on government employees' adoption of IT is scarce. Therefore, our review explores the state of research on studies that place emphasis on the interaction between the government and its employees (G2E), who play an important role for the success of IT in public sector.

## 6.3. Literature Review Design

### 6.3.1. Identifying the Relevant Literature

In order to identify the relevant work in this field, we conducted a structured literature search according to (vom Brocke et al., 2009). We collected significant search words as shown in Table 1 that cover the categories domain, behavior, environment and stakeholder. For the search process, we used meaningful combinations of the four categories but also searched for single

terms. Exemplary search strings looked like “information technology/acceptance/public sector/user” or “e-government/adoption/attitude towards/staff”.

Table 15 Search words

Domain	Behavior	Environment	Stakeholder
information technology IT/ e-government/ e-governance/ software /applications/systems/ e-file / e-procurement/ website/intenet	acceptance/ adoption/ readiness/ barriers/ resistance/ satisfaction/ motivation/ attitude/ behavior intention /use	public / government	user/ employee / servant/ staff/ workers/ managers/ authority

We searched in the following Information Systems journals, that are known as relevant journals in this field : Management Information Systems Quarterly (MISQ), Information Systems Research (ISR), Journal of Management Information System (JMIS),, The Journal of Strategic Information Systems, European Journal of Information Systems (EJIS), ACM Transactions on Information Systems, Information & Management, Proceedings of the European Conference on Information Systems (ECIS), and Proceedings of the Hawaii International Conference on System Sciences (HICSS). Furthermore, we searched in e-government journals such as International Journal of Electronic Government Research (IJEGR), Government Information Quarterly (GIQ),, Public Administration and Development, International Journal of Public Administration (IJPA), and The American Review of Public Administration and Journal of Public Administration Research and Theory (JPART). In addition, we used search databases such as Google Scholar and Web of Science to identify further relevant articles based on the citation index. We applied the search word combinations to the full text of the articles. Afterwards we identified the relevance of the articles based on their key words and abstracts and – when needed – based on the full texts. In addition, we carried out a forward search in which we identified relevant articles that were cited by our primarily identified articles as recommended by (Webster & Watson, 2002).

We conducted the literature search between June 1st 2017 and November 30th30st 2017. In total, our search word combinations identified 114 articles, which were published between 2003 and November 2017. 18 of them dealt with topics only loosely related to factors influencing e-government adoption and 63 articles considered citizens’ e-government adoption, which left us with 33 articles focusing on government employees’ adoption of IT. After completely reading the papers, we identified 28 articles that were relevant and included in our literature review. The other articles were excluded because they e.g. became obsolete or included other perspectives than the internal one despite previous indicators.

### 6.3.2. Structuring the Review

The structure of our literature review is inspired by (Hofmann et al., 2012) and according to a concept matrix as proposed by (Webster & Watson, 2002). This approach is suitable for synthesizing the literature after completely reading each article and discussing each identified concept. In order to answer our research questions (What is the current state of research in employees' adoption of IT in the public sector? Which factors influence government employees' adoption of IT? What are the needs for future research?), we coded the identified articles according to both structural categories such as research method, the sample size or the country of data collection as well as content-related categories like employee groups, IT field, the applied theory and the dependent and independent variables. In addition, we recorded the research goals, research questions, the research findings, outlooks, recommendations and limitations in order to cover the complete research approach in each article and identify gaps and needs that should be considered in future research. For the content analysis and data coding we used "MAXQDA"-tool, which is a qualitative and mixed-methods data analysis tool, and Excel-spreadsheets.

## 6.4. Results

### 6.4.1. Overview of the Relevant Articles

The 28 identified articles are presented in and categorized by employees' groups, the examined IT field, the research methodology, sample size, and country.

Table 16 Overview of the relevant articles

ID	Paper	Employees' groups	IT field	Research methods	Sample size	Country
1	(Hu, Clark, & Ma, 2003)	teachers (trained)	power point	quantitative (survey)	107	Hong Kong
2	(Bhattacharjee, 2006)	city administrators and staff members	Document Management System (DMS)	quantitative (survey)	81	Ukraine
3	(Fariborz Damanpour & Schneider, 2006a)	Managers	Innovations	quantitative (survey)	1276	USA
4	(Gupta et al., 2008)	Employees	internet technologies	quantitative (survey)	102	India
5	(J. Lee, 2008)	IT staff employees with decision-making authority	electronic approval systems (EAS)	quantitative (survey)	1,373	Korea
6	(Hung et al., 2009)	employees with experience	electronic DMS	quantitative (survey)	186	Taiwan
7	(B. Wirtz, Lütje, & Schierz, 2010)	employees and central decision makers	e-procurement	quantitative (survey)	289	Germany

8	(Melitski et al., 2010)	administrative, support staff, management, director and executive	new technologies	quantitative (survey)	99	US
9	(Nurdin et al., 2010)	employees and organization	e-government	theoretical (literature review)		
10	(Karavasilis, Zafiroopoulos, & Vrana, 2010)	Teachers	e-governance	quantitative (survey)	230	Greece
11	(Veit, Parasie, & Huntgeburth, 2011)	head of the central departments	e-procurement	qualitative (case study + interviews)	13	Germany
12	(Rahman, 2011)	Teachers	ICT	quantitative (questionnaire)	46	Bangladesh
13	(Singh & Punia, 2011)	employees (users of e-procurement)	e-procurement	quantitative (questionnaire)	345	India
14	(Shin, 2012)	Managers	e-government (city website)	quantitative (survey)	873	US
15	(Rana, Williams, & Dwivedi, 2012)	Employees	e-government	theoretical (literature review)		
16	(Hofmann et al., 2012)	Employees	e-government	theoretical (literature review)		
17	(Reeves & Li, 2012)	employees with experience	e-learning (OPD)	quantitative (survey)	11,397	US
18	(Barua, 2012)	Employees	Pension MS	quantitative (questionnaire)	60	India
19	(Rana, Dwivedi, & Williams, 2013)	Employees	e-government	theoretical (literature review)		
20	(Tarus, Gichoya, & Muumbo, 2015)	lecturers, staff, members of management and directors	e-learning	questionnaires, in-depth interviews and document analysis	148	Kenya
21	(Stefanovic, Marjanovic, Delić, Culibrk, & Lalic, 2016)	Employees	e-government	theoretical and quantitative (questionnaire)	154	Serbia
22	(Pitchay et al., 2016)	Employees	e-licensing	quantitative (survey)	92	Malaysia
23	(Chimteno, Hanif, & Mvonye, 2016)	chairpersons, officers, IT-specialists, heads of department	e-procurement	quantitative (survey)	125	Malawi
24	(Darwish, 2017)	Managers	organizational change (technology)	quantitative (questionnaire)	352	UAE
25	(Tyagi & Imrana, 2017)	Teachers	ICT	quantitative (survey)	100 (50 male + 50 female)	India
26	(Mosweu, Bwalya, & Mutshewa, 2017)	Officer	DMS	quantitative (questionnaire)	53	Botswana
27	(Deligiannis & Anagnostopoulos, 2017)	judges and court officials	ICT	quantitative (questionnaire)	101	Greece
28	(Fariborz Damanpour & Schneider, 2008)	city manager or chief administrative officer	Innovations (25 systems)	quantitative (survey) + experts	2862	USA

Employee groups: We consider different groups of employees in case they were explicitly mentioned in the articles. We distinguish employees in general, including users, officers,

teachers, staff members, judges and court officials (ID: 2, 4, 7, 8, 9, 10, 12, 13, 15, 16, 18-22, 25-27), employees with experience (use of the examined system and trained user) (ID: 1, 6, 17), IT-Staff (support, IT specialists) (ID: 5, 8, 23), )and managers (managers, organization, director, executives, city administrators, city manager, head of the central departments and central decision makers) (ID: 2, 3, 5, 7-9, 11, 14, 20, 23, 24, 28). Most articles deal with employees in general, ten articles address the organization in different forms (local organizations, central decision makers, city administrators, executive and decision-making authority), five articles explicitly mention the role of managers and three articles refer to employees who have experience with the system.

IT field: The results indicate that the most frequently examined IT field is e-government or IT/ICT in general (ID: 3, 8, 9, 10, 12, 15, 16, 19, 21, 24, 25, and 27). The remaining articles consider different e-government technologies such as document management systems (DMS), electronic document management systems (EDMS), pension management system (PMS) and document workflow management system (ID: 2, 6, 18, 23, 26), e-procurement (ID: 7,11,13,23), e-learning (ID: 17, 20), Internet technologies and website (ID: 4,14), electronic approval systems (EAS) (ID: 5), and E-Licensing (ID: 22). Furthermore, Power Point was examined in one article (ID: 1), and one article has examined 25 systems, which have not been explicitly mentioned (ID: 28).

Research methodology: The most frequently applied research methodology are quantitative surveys, which are used in twenty-three articles (ID: 1-8, 10, 12-14, 17, 18, 20-28), followed by theoretical analyses such as literature reviews in five articles (ID: 9, 15, 16, 19, 21). A combination of quantitative and theoretical methods was applied in one article (ID: 21), with panel of experts in one article (28) and with in-depth interviews and document analysis in one article (ID: 20). A qualitative study was applied in just one article (ID: 11).

Country: The articles which are based on field data (i.e. all articles apart from literature reviews) were conducted in the following countries: Most articles use data from the US (ID: 3, 8, 14, 17, 28), followed by India (ID: 4, 13, 18, 25), Germany (ID: 7, 11), and Greece (ID: 10, 27). Hong Kong (ID: 1), Ukraine (ID: 2), Korea (ID: 5), Taiwan (ID: 6), Bangladesh (ID: 12), Kenya (ID: 20), Serbia (ID: 21), Malaysia (ID: 22), Malawi (ID: 23), UAE (ID: 24) and Botswana (ID: 26) were presented in one article each.

### 6.4.2. Theories and Models

With regard to the theories and models, TAM is the most frequent applied theory, followed by UTAUT. TPB, DTPB, and DOI have been used in two articles each. DeLone and McLean's IS success model and the elaboration-likelihood model have been used in only one article respectively (see Table 17).

Table 17 Theories and models in the identified articles

Theories and models	Paper ID
TAM	1, 8, 13, 18, 20, 22, 27
UTAUT	4, 18, 26
TPB and DTPB	6, 8
DOI	3, 28
DeLone and McLean's IS success model	21
Elaboration-likelihood model (ELM)	2

### 6.5. Factors Influencing Government Employees' Adoption of IT

Despite the number of different applied theories and models, most (quantitative) articles investigate behavioral intention as dependent variable (twelve articles) followed by adoption in five articles, and actual use and attitude towards use in four articles each. Adoption was the dependent variable in two articles by the same author (ID: 3 and 28) examined according to the DOI in three phases of innovation adoption: initiation, adoption decision and implementation. Further variables such as barriers of the action-guiding array of the implementer, attitude, general computer proficiency and ease of access to the technology were also presented as dependent variables, however, less frequently. Looking at the influencing factors according to the employee' groups, we can identify a taxonomy which distinguishes between technical, individual, managerial, organizational, trusts, environmental (social and external) and demographic factors.

#### 6.5.1. Technological Factors

Behavioral intention is the most frequently used dependent variable, which in turn is significantly influenced mostly by technological factors such as perceived usefulness (or

performance expectancy in the case of UTAUT) and perceived ease of use (respectively effort expectancy). Further technological factors, which positively influence user adoption of IT refer to system quality, compatibility, data security, system integration, infrastructure support, and technical support (ID: 1, 2, 3, 4, 6, 10, 13, 14, 18, 21, 22, 23, 26, 27). Perceived usefulness was found as the most important determinant for employees' intention to use IT (ID: 1). A respective study on performance expectancy found performance expectancy as the most influential factor on behavioral intention to adopt a system (ID: 18, 26). One study suggests to involve users in system design and requirement elicitation to improve adoption with the argumentation that such methods might improve users' perceived usefulness and ease of use, which in turn improves the user adoption (ID: 27). Another study considers system quality as a component to measure the success of an e-government system (ID: 21). By contrast, innovation characteristics in terms of complexity were found to be non-significant in association with innovation adoption (ID: 28). Articles focusing on technological facets of IT mainly consider government employees in general and in part employees with experience in their research.

#### 6.5.2. Individual Factors

Individual factors in studies on employees' adoption of IT in the public sector refer to the factors technological skills/technical knowhow/IT capability, self-efficacy, subjective norms, interpersonal influence, individual internal barriers (technical knowhow, risk-oriented attitude), training, user expertise, attitude, perceived risk, computer anxiety, computer attitude, resistance to change, user satisfaction, job relevance, job satisfaction (attitude towards job), net benefits, relative advantages, knowledge of the benefits, personal innovativeness, responsibility, staff motivation, and interest (ID: 1, 2, 5, 6, 7, 9, 11, 17, 20,21, 22, 23, 24, 26, 43). In studies that consider experienced employees, we found that the examined independent variables such as interpersonal influence and self-efficacy were significant antecedents of users' intention to use IT. Three articles examined the pre and post adoption of IT by for example conducting a longitudinal study with participants in a training course (ID: 1, 6, 17). The results indicate that perceived usefulness and user experience in combination have a stronger impact on intention to use than perceived usefulness alone and that users' technological readiness depends on their technological skills and, thus, increases with training and participation. IT staff members are more likely to use IT because of their IT capability (ID: 5, 14). Further articles support the positive influence of computer self-efficacy and technical knowhow on behavioral intention to use a system (ID: 1, 6, and 13). Employees in public organizations seem to lack qualification and perceive individual internal barriers in terms of technical knowhow and risk-oriented

attitude (ID: 7). Barriers of the action-guiding array of the implementer are significantly determined by the barriers of the employees (ID: 7). The implementer refers in this study to decision makers, that are responsible for the implementation of the according IT in the public sector. They possess like every individual a so-called cognitive action-guiding array, which influences their action. Continuously convincing employees to interact with new technology could lead to a lower resistance against technological innovations (ID: 7). Resistance to change by users is found as one of the factors hindering IT adoption in the public sector by a further article (ID: 23). In addition to technological factors, one study (ID: 26) revealed that attitudes towards computer and computer anxiety were additional factors that influenced the adoption. Personal innovativeness and relative advantage directly or indirectly influence intention to use and attitudes towards use (ID: 22, 43). One paper argues that employees use e-governance services more if they understand their value and will use them if it helps them to work more efficiently (ID 43). Other studies explained the effect of motivation and interest on the use of a system (ID: 20 and 23). Fear of losing their jobs because of IT implementation was mentioned as a cause for lack of interest (ID: 20). Articles discussing individual characteristics of factors that influence IT adoption in the public sector have mainly investigated the internal perspective from employees in general and employees with experience or IT staff members. Very few of them consider specific employee groups such as managers.

### 6.5.3. Managerial Factors

Articles dealing with the employee group of public managers reveal that public managers' perceptions of technology, their attitudes toward public service, their commitment to public service and their organizational power positively influences their use of IT (ID: 8 and 14). Public managers with a higher public service commitment show higher degrees of IT use according to findings in one article (ID: 14). Another article indicates that decision-making authority influences public employees' adoption but depends on their IT capability (ID: 8). In this context, the presence of the IT department significantly contributes to managers' use of IT. Two articles, for example, recommended organization managers to organize training programs to improve the employees' computer self-efficacy (ID: 6, 13). Other factors discussed are managers' characteristics such as age, tenure, education, gender, pro-innovation and political orientation (ID: 3, 28). Managers' characteristics in these articles were distinguished into personal and demographic characteristics. The results indicate that managers' personal characteristics contribute for more to innovation adoption than demographic characteristics such as age and gender. Managers' education was found to be a positive factor affecting

innovation in public organizations. Skills and competencies are also required in managing the IT adoption process in the public sector (ID: 3, 28). These findings indicate that by further education, managers' enhanced expertise and intellectual capacity will be beneficial to innovation in organizations. Leaders in public organizations influence workers' motivation and job satisfaction, create a work and social climate to improve morale, and encourage and reward innovation and change (ID: 3). Supervisory leadership, which actively builds teams, supports them, emphasizes goals and facilitates performance improvement and problem solving, positively influences individual willingness to adopt technology (ID: 8).

#### 6.5.4. Organizational Factors

Considering the organization itself, the role of the organization is explored from various perspectives. On the one hand, the organizational role is considered in terms of the organization culture and climate including internal corporate barriers such as hierarchical culture and bureaucracy, organizational goals, mission and visions, decision-making practices, organization of work, involvement, participation, coordination and communication flow (ID: 3, 7-9, 23, 24). Findings from the analysis of organizational culture and climate on individuals' adoption of IT in public organizations yielded a statistical significance between individuals' general willingness to adopt technology and their perception of organization of work, communication flow, decision-making practices, and coordination (ID: 8). Similar findings are obtained by analyzing internal corporate barriers such as hierarchical culture and bureaucracy (ID: 7). Organizational factors in terms of financial resources, political commitment, centralization and peer organization experience are among the strongest determinants of IT-adoption (ID: 11). Economic health was found as a positive influencing factor of adoption decision in public organizations (ID: 3). These findings reveal that organizations with greater economic health invest more in innovation, partly because they have financial resources to cover the risk of failure. On the other hand, organizational factors are related to managerial, environmental, trust characteristics as well as to demographic factors such as complexity and size of organization (ID: 3, 9).

#### 6.5.5. Environmental Factors (Social and External Characteristics)

Regarding the analysis of environmental characteristics, we can distinguish between social and external environmental factors. Social factors like social influence (ID: 9, 18, 26), image (ID: 19) and visibility/observability (ID: 20) were found to be significant antecedents of employees' intention to use IT. Visibility in this context refers to situations when employees see others

using a system, they would develop the intention to use it, too. Observability refers to employees who want others to use the system first before trying it, those would intent to use the system after seeing others using it (ID: 20). Another discussed issue concerning environmental characteristics refers to external factors. One article has found that external environmental demands and constraints such as urbanization, community wealth and population growth positively influence innovation adoption (ID: 3). The existence of trade unions provides a further external factor influencing the adoption process in public organization, that should be confirmed in future research (ID: 3). This findings reveal a negative influence of the existence of trade unions on adoption decision, but not on initiation or implementation. External barriers in terms of implementation costs, missing acceptance of the suppliers and missing experience of the suppliers were identified as second order construct influencing the barriers of implementers in the public sector (ID: 7). Provider acceptance among local providers as well as legal frameworks were found to be external determinants influencing IT adoption (ID:11).

#### 6.5.6. Trust

Government organizations are regarded to be responsible for the transparency and trust in the information and message-related arguments on the used system. The variables information quality, argument quality, source credibility and adaptability, which – at first glance – seem to be quite different, turn out to be in fact quite similar and address the same type of factors, i.e. trust in information and communication (ID: 8, 9, 15, 6 21). These factors indirectly underline the contribution of the organization in the adoption, implementation and use of IT. Trust on data were found as significant factors influencing user intentions (ID: 18).

#### 6.5.7. Demographic Factors

Demographic factors were mostly identified as control variables influencing IT adoption in the public sector and refer to factors such as gender, age, education, organizational complexity and size (ID: 3, 12, 15, 21 and 25). Findings regarding the significance of gender contradict with each other. Whereas one study finds that women have a more favorable attitude toward IT than men (ID: 25), other findings reveal that gender variations do not exist in this context (ID: 3, 12, 15 and 19). Organization complexity and size have in contrary a positive influence on innovation adoption in public organizations (ID: 3). Concerning managerial characteristics, education was found as an influencing factor of adoption (ID: 3). The following table illustrates

the most frequent independent variables and combines factors with the same or similar characteristics into the identified taxonomy (see Table 18).

Table 18 Influencing factors of government employees' adoption of IT

Characteristics	Factors
Technological	perceived usefulness, perceived ease of use, performance expectancy, effort expectancy, system quality, compatibility, data security, system integration, infrastructure support, and technical support
Individual	technological skills/ technical knowhow/ IT-capability, self-efficacy, subjective norms, interpersonal influence, individual internal barriers (technical knowhow, risk-oriented attitude), training, user expertise, attitude, perceived risk, computer anxiety, computer attitude, resistance to change, user satisfaction, job relevance, job satisfaction (attitude towards job), net benefits, relative advantages, knowledge of the benefits, personal innovativeness, responsibility, staff motivation and interest
Managerial	decision-making practices, interpersonal influence, public service commitment, organizational power, internal corporate barriers (tenure, education), managers' personal characteristics , IT capability, training, skills and competencies and supervisory leadership
Organizational	organization culture and climate, bureaucratic, public service commitment, mission, goal integration, organization culture and climate, organizational commitment, involvement (participation, commitment, responsibility), financial resources, political commitment, centralization, peer organization experience, economic health and complexity
Trust	Trust, trust on data, information quality, argument quality, source credibility, adaptability (transparency, trust)
Environmental	Social: social influence, image, visibility/observability External: external demands (urbanization, community wealth and population growth), the existence of trade unions, legal framework, external barriers (costs of the implementation, missing acceptance of the suppliers and missing experience of the suppliers), provider acceptance among local providers and legal framework
Demographic	gender, size, tenure and education

## 6.6. Discussion and Recommendations for Future Research

Our analysis of the factors influencing IT adoption in the public sector illustrates some emergence from the investigation of standard constructs on special factors that take a closer look at the specifics of the public sector. The fact that most studies are based on widely used theories such as TAM, TPB and UTAUT inevitably leads to standard constructs such as

perceived usefulness and perceives ease of use being analyzed over and over again. That is not erroneous in itself, but the research field on IT adoption of government employees' remains incomplete where special characteristics of the public servants and characteristics of the public sector are not appropriately taken into account. Scholars which investigated managers as main stakeholders and examined the adoption process from the DOI view come up with new insights into IT adoption and highlighted antecedents particularly on the organizational and managerial level in the public sector.

Articles including antecedents on the organizational and managerial level and examining the adoption process reveal different interesting impacts of the independent variables on the analyzed dependent variables (initiation, adoption decision and implementation). (Engelbert & Reis Graeml, 2014) argues that adoption happens in the organization when its decision makers analyze and assess available options of IT artifacts. The organization begins with the implementation process after having adopted it. Several further important organizational and managerial factors have not been included such as centralization, formalization and differentiation, and managers' personality characteristics (need for achievement, locus of control and tolerance for ambiguity) (ID: 3, 28) and should be considered in future research.

Considering the original context of the constructs influencing the employees' use of a given system, the outlooks, recommendations (as far as given) and limitations stated in the analyzed articles, we noticed that many other (less considered or yet unconsidered) constructs turn up to be relevant and should be investigated in future research. These include computer anxiety, age, training, education, competencies, information (being informed), involvement and participation. In this context, computer anxiety was identified as a significant factor whose potential role is not yet fully explored in government employees' adoption of IT (ID: 26). Computer anxiety is further supposed to be correlated with other factors such as age and technology skills. These and other factors could be critical moderating variables between resistance and the level of implementation in public sector, which should be investigated in future research. IT adoption research should investigate characteristics not only of users that are happy to use the IT, but also of those who refute, change, replace or complement it (Engelbert & Reis Graeml, 2014). Even though the impact of attitude, age and education has not always been found as significant as reported by (Rana et al., 2012), the literature rather agrees that only by including all employees – in particular managers – in training and continuous education, the level of performance in the public sector can permanently be maintained (Molnár, Doreen, 2014). According to theories of participative decision making and

organizational change, by involving users in the system development process, higher user adoption rates can be achieved (Amoako-Gyampah, 2007). (Engelbert & Reis Graeml, 2014) understands adoption of an artefact as a process, in which users actively participate not only on the use but also all the time within the modeling process of the artifact. Further factors such as the users being informed about the introduced technology also play an important role in the processes of creating user adoption of new IT [10]. According to (Rogers, 1995), user acceptance is particularly influenced by the provided information content and IT-relevant details as well as the communication channel used for spreading the information. Our literature review showed that one aspect that warrants further research is the user's individual perception of being informed (Bhattacharjee, 2006). The importance of information has already been shown in related contexts such as citizens' adoption and continuous use of an e-government system (Teo, Srivastava, & Jiang, 2009) as well as in the government-to-business context (Conroy & Evans-Cowley, 2005). Some articles left out important factors in their analysis. For example, the interaction between the dependent and independent variables – especially the relation between perceived usefulness and perceived ease of use and other constructs such as subjective norms, output quality, job characteristics, organizational conditions, and social influence – seem promising for an in-depth analysis (ID: 14) as well as the influence of public service commitment and the interaction between work attitudes and technology attitudes. In this context, it is highly recommended to especially examine the impact of moderating variables on the independent variables (ID: 15).

Since our article focuses on the internal perspective, we analyzed the determinants of IT adoption within the context of public sector peculiarities. Prior research on differences between public and private sector emphasizes individual, organizational, managerial as well as environmental and trust characteristics of the public sector ((Boyne, 2002; Bullock, Stritch, & Rainey, 2015; Buurman, Delfgaauw, Dur, & Van den Bossche, 2012; Reddick, 2012)). Trust in the public sector has been discussed in various issues especially in e-government research on citizens' use of e-government services ((Bélanger & Carter, 2008; Carter & Bélanger, 2005; Susanto & Aljoza, 2015; Welch, Hinnant, & Moon, 2005)). Individual characteristics are related to individual attitude and beliefs as described in the TRA, TPB and TAM. In the context of public sector specifics, (Hartog, Ferrer-i-Carbonell, & Jonker, 2002b) found for example that risk attitudes are more strongly related to individual characteristics in the public than in the private sector. Similar results are obtained by (Buurman et al., 2012), who argue that employees in the public sector are more risk averse than employees in private sector. (Hartog et al., 2002b) claims that women in public sector are more risk averse than men. (Frank & Lewis, 2004)

reported about public service motivation and finds that public employees are paying more attention on job security and to serve society or public interest. Further comparing statements contain distinctive characteristics of public organizations and their employees in term of organization commitment, organizational environments, goals, structure, managerial values ((Boyne, 2002), (Bullock et al., 2015), (Rainey, 1983)) as well as trust (Zeffane & Bani Melhem, 2017), and external environment (Reddick, 2012). Typical differences at the organizational level are due to the complexity (Boyne, 2002) and so called “red-tape” in the public sector (Reddick, 2012). This means that public organizations have to deal with many more stakeholders with different demands and constraints and are more bureaucratic, have more formalized procedures, less flexibility and extensive amount of rules. On the managerial level, (Reddick, 2012) argues that managers’ leadership in the public sector is influenced by the employees’ attitude towards work. Managers in this sector have less autonomy and face more challenges for promoting and adopting IT. Based on the sociotechnical theory, (Reddick, 2012) emphasizes the need of public managers not only to understand the technical issues of the technology being implemented but also within the social perspective implying the people who use this technology. Furthermore, external issues such as political constraints and external institutional control influence public organizations as well (Boyne, 2002).

Despite the proposed IT adoption models in the literature, there is no generic e-government adoption research model [4]. With regard to the differences between public and private sector and based on our analysis, we see a great potential to fill this gap including our identified taxonomy (see Table 18) as main antecedents for employees’ adoption of IT in the public sector. We propose an employees’ IT adoption model in the public sector as depicted in Figure 13.

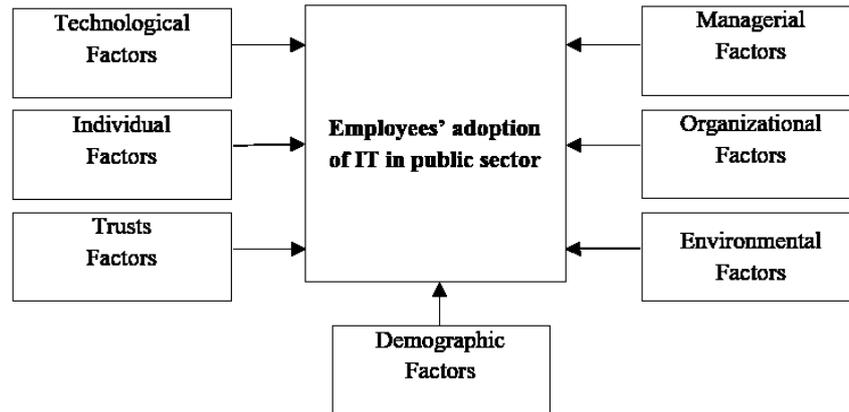


Figure 13 Employees' adoption of IT in the public sector: a conceptual model

We recommend to empirically test the proposed model to explore its validity, to identify interdependencies of the identified factors and to explore further relevant factors.

Research on the use of IT in the public sector is almost inevitably connected with the notion of e-government. Although e-government covers various aspects of IT in the public sector, in most cases the studies referred to the use of a government website. However, it is essential to examine more sophisticated and widespread e-government technologies and other implemented software.

The research on IT adoption within the interaction domain G2E still needs to be deepened; this argument is supported by the low number of articles with high quality that explicitly cover this area. In addition, most of the studies are quantitative studies using a survey and emphasizing quantitative data, and even the literature reviews delivered mostly quantitative analyses of findings. In our review, we focused on providing a qualitative view by examining the antecedents and the original context of the variables. In addition, our analysis was focused on special characteristics of the public sector and regarded the relationships between different aspects (type of employees, type of studies, goals and research questions, results, recommendations and limitations).

Our evaluation is summarized in the following research agenda for future research needs (see Table 19)

Table 19 Research agenda for government employees' IT adoption

Categories	Recommendations
Theories and models	We suggest to use the full set of variables of the research models (such as TAM or UTAUT) to cover all antecedents. The results cannot be validated by ignoring an important part of a model. Furthermore, research should look beyond the traditional adoption theories and be open to integrate further promising models. In addition, there is a need for developing a generic e-government adoption research model, which considers public sector peculiarities especially on the individual, organizational, managerial and environmental level.
Employees' groups	Studies that distinguish a special group of government employees reveal special influence factors for these groups. It is useful to thoroughly identify which different user groups exist in the public sector as well as to better differentiate the different requirements and expectations for each user group. Furthermore, it is critical to reveal what does this distinguish contribute for the research in IT adoption.
Influencing factors	Other than perceived ease of use and perceived usefulness, environmental, managerial, organizational and special individual constructs in public organizations should be considered intensively. Interdependencies between those factors should be examined. Many articles showed the need to deeper investigate the influence of the role of managers and of factors such as computer anxiety, technological skills, training, age, tenure, education, competencies, involvement, participation and information. Furthermore, the relation with other moderating variables such as public service motivation and innovation work behavior should be analyzed.
Cultural considerations	We recommend to conduct studies in both developed and developing countries, taking into account the different cultural traits even within developed countries e.g. between the US and Europe as well as developing areas such as Asia and Africa.
IT field	Rather than considering e-government as a black box or analyzing government websites, we suggest examining different technologies, especially those which are used or will be more widespread in governments.
Research methodology	We recommend to also use qualitative methods such as case studies, interviews and phenomenology especially as explorative strategy for the development of hypotheses or as supplementary confirmation in a mixed study. In addition, longitudinal studies are adequate to examine the pre and post adoption in more detail.

## 6.7. Conclusions and Limitations

Our literature review provides the state of research on employees' adoption of IT in the public sector, thereby especially conducting a qualitative analysis and evaluation of the content of the reviewed articles. We conducted a structured literature review according (vom Brocke et al., 2009) and searched for high quality articles with the help of predefined search words. In total, we identified 28 articles on the employees' adoption of IT in the public sector that matched our quality criteria. We provided a concept centric synthesis of the identified articles as proposed by (Webster & Watson, 2002) and presented the results summarized in two tables: The first table presents the categories employee groups, IT field, research methods, sample and country of data collection, and the second one contains the applied theories and models. In addition, we recorded the research questions, goals, outlooks, recommendations and limitations to better understand and reproduce the relevant issues in each article. We carried out a qualitative analysis and evaluation of findings with a focus on influencing factors of employees' adoption with the peculiarities of the public sector, the relationship between dependent, independent variables and moderating factors. Furthermore, we used the recommendations, outlook and limitation sections of the analyzed articles to identify further promising factors that are likely to influence employees' IT adoption. We summarized our evaluation based on the applied concept matrix and developed a research agenda as recommendation for future research. Our findings reveal the need for a deeper investigation of special individual, managerial, organizational, environmental, trust and demographic factors that influence employees' adoption of IT in public sector. With this respect, we proposed a research model for employee IT adoption that considers public sector peculiarities based on the identified taxonomy. In addition, we see the necessity to conduct both qualitative and quantitative approaches to fully grasp the characteristics of this area of research.

Our study has several limitations. The number of the considered articles is limited due to the acknowledged choices. In addition, our research focused on the IT adoption from the employees' perspective in the public sector. Therefore, further research could test our model empirically, identify interdependencies of the identified factors, examine more articles in IT adoption in public sector and explore further relevant factors.



## 7. Beteiligung der Beschäftigten bei IT-Projekten in öffentlichen Verwaltungen – Umfrage in deutschen Bundesbehörden am Beispiel der E-Akte

<b>Title</b>	Beteiligung der Beschäftigten bei IT-Projekten in öffentlichen Verwaltungen – Umfrage in deutschen Bundesbehörden am Beispiel der E-Akte
<b>Authors</b>	Mariem Ben Rehouma
<b>Publication outlet</b>	Multikonferenz Wirtschaftsinformatik 2018
<b>Publication status</b>	Published
<b>Reference in this document</b>	P2
<b>Abstract</b>	<p>Die Digitalisierung der öffentlichen Verwaltung führt zur Umsetzung verschiedener IT-Projekte wie der Einführung der elektronischen Akte (E-Akte) in deutschen Bundesbehörden. Mit der Einführung der E-Akte verbunden sind technische und organisatorische Herausforderungen, aber auch Auswirkungen auf die Arbeit der Beschäftigten. Ein Erfolgs- und Akzeptanzfaktor für die Einführung von IT-Projekten ist die Beteiligung der Beschäftigten im Einführungsprozess. Dieser Artikel untersucht mit Hilfe einer Online-Umfrage unter Personalräten in deutschen Bundesbehörden die Beteiligung des Personalrats und der Beschäftigten bei der Einführung der E-Akte und die damit verbundenen Auswirkungen. Die Ergebnisse ermitteln den Einführungsstand der E-Akte und zeigen Optimierungspotenzial bei den Beteiligungsmöglichkeiten und bei der Kommunikation über die möglichen Auswirkungen.</p> <p>The digitisation of public administration leads to the implementation of various IT projects such as the introduction of the electronic file (e-file) in German federal administrations. The introduction of the e-file is associated with technical and organisational challenges, but also has implications for the work of employees. A success and acceptance factor for the introduction of IT projects is the participation of employees in the introduction process. This article uses an online survey among staff councils in German federal administrations to examine the participation of the staff council and employees in the introduction of the e-file as well as the implications associated with this process. The results report on the status of the introduction of the e-file and show potential for optimization in the participation opportunities and in the communication about the possible implications.</p>
<b>Keywords</b>	Beschäftigte, Beteiligung, Bundesbehörden, E-Akte, IT-Projekte



## **Beteiligung der Beschäftigten bei IT-Projekten in öffentlichen Verwaltungen – Umfrage in deutschen Bundesbehörden am Beispiel der E-Akte**

### **7.1. Einleitung**

Die Entwicklung der Integration und Nutzung von Informations- und Kommunikationstechnologien in öffentlichen Verwaltungen hat in den letzten Jahren rasant zugenommen (Liu & Yuan, 2015). Die Digitalisierung der öffentlichen Verwaltung steht in Strategien und Agenden vieler Regierungen im Vordergrund (Parisopoulos, Tambouris, & Tarabanis, 2007). So verfolgt auch die Bundesregierung Deutschland mit der Einführung verschiedener IT-Projekte das Ziel, die Verwaltung effektiver und effizienter zu gestalten (Bundesregierung, n.d.). Ein Schwerpunkt der Verwaltungsmodernisierung ist die Einführung der elektronischen Aktenführung (E-Akte) (Henning Lühr, n.d.). Im Rahmen der Umsetzung des E-Government-Gesetzes in Deutschland soll mit dem Aktionsplan E-Akte der Bundesregierung die Einführung der E-Akte in den Bundesverwaltungen bis 2020 abgeschlossen sein (BMI, 2014). Mit der E-Akte soll die Verwaltungsarbeit im Vergleich zur Umlaufmappe effektiver und effizienter werden (Kühnert & Ehneß, 2016). Die Beschäftigten stellen sich damit auf digitale Medien um, wofür sie gewisse Kompetenzen und Qualifikation aufbauen sollen. Nicht nur auf die Qualifikation der Beschäftigten, sondern auch auf ihre Arbeitsbelastung und Gesundheit kann die Einführung der E-Akte Auswirkungen haben (Chevalier & Kaluza, 2015). Weitere Auswirkungen der Digitalisierung stecken in Rationalisierungspotenziale, die bis hin zum Arbeitsplatzverlust reichen können (Düll et al., 2016; Famulla, Gut, Möhle, Schumacher, & Witthaus, 1992). Ein entscheidender Erfolgs- und Akzeptanzfaktor für die Einführung solcher Digitalisierungsprojekte ist die Beteiligung der Beschäftigten im Einführungsprozess (O'Brien, 2002). Die Beteiligung der Beschäftigten sowie Beschäftigtenvertretung soll für eine gute Arbeitsatmosphäre sorgen und die Akzeptanz von Veränderungen erhöhen (Molnár, Doreen, 2014). Viele Studien berichten über die Wichtigkeit der Beteiligung und die daraus resultierenden Vorteile für die Beteiligten selbst und für die Organisation (Favero et al., 2016; Fernandez & Moldogaziev, 2013; Horton & Farnham, 2003; Ichniowski, Kochan, Levine, Olson, & Strauss, 1996). Dabei existieren verschiedene Beteiligungsmöglichkeiten wie beispielsweise Beteiligung durch Teilnahme an Schulungen und Qualifizierungsmaßnahmen (Favero et al., 2016), (Horton, 2003a), Beteiligung durch Beschäftigtenvertretung wie den Personalrat in verschiedenen Projektgruppen (Favero et al., 2016) und Beteiligung durch Evaluation und Testen der Gebrauchstauglichkeit (de Róiste, 2013). Darüber hinaus wird die Nutzung von

Beteiligungsinstrumente wie beispielsweise eine Dienstvereinbarung oder Beteiligungsvorlagen von vielen Gewerkschaften empfohlen. Obwohl Beteiligung als signifikanter Faktor für die Akzeptanz von IT-Projekten in öffentlichen Verwaltung gilt und dafür verschiedene Möglichkeiten vorgesehen sind, wurde diese wissenschaftlich bislang nicht untersucht. Es liegen wenig Erfahrungswerte darüber vor, wann und welche Beteiligungsinstrumente von wem genutzt werden und wie diese bewertet werden. Auch im Hinblick auf die mit der Einführung verbundenen Auswirkungen auf die Arbeit der Beschäftigten existieren bislang wenig wissenschaftliche Erkenntnisse. Um diese Forschungslücke zu schließen, adressiert dieser Artikel folgende Forschungsfrage:

Wie werden Beschäftigte und Personalräte bei IT-Einführungsprojekten in öffentlichen Verwaltung beteiligt?

Um diese Forschungsfrage zu beantworten werden am Beispiel der Einführung der E-Akte in deutschen Bundesbehörden folgende Unterfragen gestellt:

- In welchem Stand befindet sich die Einführung der E-Akte in den Bundesbehörden?
- Welche möglichen Auswirkungen hat die Einführung der E-Akte auf die Arbeit der Beschäftigten und wie werden diese von der Dienststelle thematisiert?
- Welche Beteiligungsmöglichkeiten und Beteiligungsinstrumente werden zur Einbeziehung des Personalrats und der Beschäftigten bei der Einführung der E-Akte genutzt und wie werden diese bewertet?

In diesem Artikel liefert Kapitel 2 einen Überblick über den Stand der Forschung zum Thema Beteiligung insbesondere bei der Einführung von IT-Projekten in öffentlichen Verwaltungen. Die verwendete Methodik wird in Kapitel 3 beschrieben, gefolgt von den Ergebnissen in Kapitel 4. Die Ergebnisse werden in Kapitel 5 diskutiert und die Limitationen dieser Studie sowie ein Ausblick auf zukünftigen Forschungsbedarf präsentiert.

## 7.2. Stand der Forschung

### 7.2.1. Beteiligung

Der Begriff Beteiligung ist in der Literatur synonym vertreten mit dem Begriff Partizipation und beschreibt verschiedene Formen der Einbindung der Mitarbeiterinnen und Mitarbeiter einer Organisation. Es wird unterschieden zwischen direkter und indirekter Partizipation bzw. formaler und informaler Partizipation (Dickson, 1981), (Dachler & Wilpert, 1978). Die direkte

Partizipation erfordert die unmittelbare persönliche Beteiligung der Beschäftigten, wohingegen die indirekte Partizipation die mittelbare Beteiligung durch Interessenrepräsentanten charakterisiert (Dachler & Wilpert, 1978). Für die formale Partizipation ist eine gesetzliche Regelung für die Legitimierung notwendig beispielsweise durch einen Vertrag. Die informale besteht mehr aus einem Konsens zwischen den interagierenden Mitgliedern (Dachler & Wilpert, 1978). Weitere Literatur berichtet über das Maß der Beteiligung der Beschäftigten und zeigt die Steigerung von einfach informiert werden, zur Beratung hingezogen werden bis hin zur Mitbestimmung und Steuerung der Entscheidungsfindung (Marchington & Wilkinson, 2005). In der deutschen Literatur unterscheidet sich der Begriff Beteiligung vom Begriff Mitbestimmung, der den rechtlichen Anspruch der institutionalisierten Beteiligung durch Vertreter im Betriebs- und Personalrat umfasst (Bloch & Burkhardt, 2010).

Obwohl Beteiligung als Fachbegriff aus dem Mitbestimmungsrecht gilt, wird in diesem Artikel der Begriff Beteiligung für Partizipation verwendet und bezieht sich sowohl auf die direkte und aktive Partizipation der Beschäftigten als auch auf die indirekte Form durch die Vertretung des Personalrates, ohne dabei auf die Mitbestimmungsrechte einzugehen. Im Hinblick auf das Ziel dieser Studie, wird die Mitbestimmung hier nicht explizit untersucht.

### 7.2.2. Beteiligungsmöglichkeiten bei der Einführung von IT-Projekten

Eine Reihe von Beteiligungsmöglichkeiten der Beschäftigten bei einer Änderung in einer Organisation sind zu finden. Eine interessante Perspektive zeigt den Beteiligungsprozess der Beschäftigten an einer Entscheidungsfindung als ein Kontinuum, das die unterschiedlichen Zugänge reflektiert, die die Beschäftigten für diese Entscheidung haben oder davon abhängt, inwiefern die Beschäftigte diese Entscheidung beeinflussen können (Dachler & Wilpert, 1978). Als Beispiel wird es in dieser Studie unterschieden, ob die Beschäftigten (im Voraus) über die Änderung informiert werden oder nicht, ein Veto abgeben können, Änderungswünsche und Feedback der Beschäftigten berücksichtigt werden, und berichtet über weitere Beteiligungsmöglichkeiten wie beispielsweise die Beauftragung bei Routinetätigkeiten, Schulungen oder die Evaluation der zu erwarteten Leistung.

Bei einem IT-Projekt ist die Beteiligung der End-User relevant für die Entwicklung eines verwendbaren Produktes (Rasmussen et al., 2011), für die Akzeptanz und für den Erfolg des Projektes (Hoang, Deegan, & Rochford, 2013). Nichtsdestotrotz ist die Beteiligung bei der Entwicklung aller zu erwartenden Nutzerinnen und Nutzer des Produktes nicht möglich und begrenzt sich meistens auf Vertreter der Beschäftigten. Hierbei ist die Auswahl von

Beschäftigten mit fachlichen Kompetenzen ein entscheidendes Kriterium für die Beteiligung (Rasmussen et al., 2011), (Bødker K. et al., 2004). Im Hinblick auf die Gebrauchstauglichkeit eines IT-Produktes zeigen viele Studien die Wichtigkeit der Beteiligung der End-User bei der Entwicklung oder auch im Nachhinein, um das Produkt zu testen (Rosson & Carroll, 2002), (de Róiste, 2013). Die Durchführung von Benutzerbefragungen als Evaluationsbericht wird empfohlen, um daraus Informationen aus Nutzerperspektive zu gewinnen (de Róiste, 2013).

Im öffentlichen Sektor sollen mehr Maßnahmen ergriffen werden, um die Beteiligung der Beschäftigten in einem IT-Projekt zu sichern (O'Brien, 2002). Ein Praxisleitfaden der Bundesregierung Deutschland soll das Projektmanagement in öffentlichen Verwaltungen unterstützen und gliedert die Einführung von IT-Projekten in definierte Phasen: Initiierung, Leistungsausschreibung und Vergabe, Entwicklung, Pilotierung und die Phase des Regelbetriebes (Bundesministerium des Inneren (BMI), 2012). Die Initiierungsphase umfasst mehrere Aktivitäten und beginnt mit der Projektidee und endet mit dem Planungsauftrag. Es werden einzelne Mitarbeiterinnen und Mitarbeiter für die Projektgruppen bestimmt und die grobe Projektstruktur wird definiert. In der Ausschreibung und Vergabe werden die Projektanforderungen definiert, die Ausschreibung veröffentlicht und Vergabeentscheidungen getroffen. Die Anforderungen werden in der Entwicklungsphase implementiert und angepasst. Teststellungen mit Testszenarien für die Bewertung der Funktionalitäten des Produktes werden hier für die Pilotierung durchgeführt. Nach erfolgreichen Tests in der Entwicklungsphase werden im Pilotbetrieb echte Daten in eine echte Umgebung (eine bzw. mehreren Dienststellen) eingeführt. Hier wird die Leistung sowie die Gebrauchstauglichkeit getestet. Nach einem erfolgreichen Pilotbetrieb kommt die flächendeckende Einführung zum regulären Betrieb. Weitere Änderungen durch Releases und Updates werden in dieser Endphase der Einführung durchgeführt. Es wird empfohlen, bei der Erstellung der Leistungsausschreibung die End-User einzubinden bzw. ihre Anforderungen dabei zu berücksichtigen ("Government IT projects," 2003). In Deutschland fordern viele Gewerkschaften mehr Beteiligung bei IT-Projekten und stellen Handreichungen und Leitfäden beispielsweise für die Einführung der E-Akte mit Phasenmodellen und Checklisten für Personalräte und Beschäftigte zur Verfügung, um das Thema bei den relevanten Akteuren anzuregen (Kommune 21, 2015), ("Handreichung Gutes Arbeiten mit der elektronischen Akte Anregungen für Verwaltungsbeschäftigte und Personalräte Vereinte Dienstleistungs- gewerkschaft," n.d.). Trotz den gesetzlichen Vorgaben nach dem §6 EGovG-Bund zur Einführung der E-Akte und die für die Umsetzung gesetzten Fristen der Bundesregierung gibt es bislang keine belastbaren Angaben darüber, inwiefern die E-Akte in den Bundesbehörden eingeführt ist und welche Organisationseinheiten dabei beteiligt

sind. Der Aktionsplan E-Akte fördert die Beteiligung des IT-Betriebes und der Organisation bei Sicherheitsmaßnahmen zur Einführung der E-Akte (BMI, 2014), aber bislang wurden die Beteiligungsmöglichkeiten der Beschäftigten bei der Einführung von IT-Projekten im öffentlichen Sektor in der Praxis kaum untersucht. Dieser Studie untersucht die Beteiligung der Beschäftigten bei der Einführung von IT-Projekten in öffentlichen Verwaltung am Beispiel der Einführung der E-Akte in deutschen Bundesbehörden. Im Folgenden wird die methodische Vorgehensweise dieser Studie erläutert.

### 7.3. Methodik

Um die Beteiligung der Beschäftigten bei der Einführung von IT-Projekten in öffentlichen Verwaltungen zu untersuchen, wurde in dieser Studie am Beispiel der Einführung der E-Akte in deutschen Bundesbehörden ein Online-Fragebogen auf Grundlage des Forschungsstandes konzipiert. Dabei wurde dem Begriff „E-Akte“ eine Erläuterung hinzugefügt mit Alternativbenennung wie „DMS Dokument Management System“ verwendet, da es unterschiedliche Softwares in den Behörden zur Umsetzung der E-Akte verwendet werden. Die Stichprobe wurde auf Personalräte als Beschäftigtenvertretung begrenzt, da der Zugang zu den Beschäftigten etwas erschwert war.

Der Online-Fragebogen wurde nach einem ausführlichen Pretest mit Experten, Beschäftigten und Personalratsmitgliedern öffentlicher Verwaltungen durch eine E-Mail-Einladung der Gewerkschaften des Deutschen Beamtenbundes<sup>1</sup> und des Deutschen Gewerkschaftsbundes<sup>2</sup> an Personalratsmitglieder in deutschen Bundesbehörden verschickt. Der Fragebogen umfasste wenige offene Fragen und vornehmlich geschlossene Fragen in Form von Aussagen mit fünf Likert-Skalenpunkten („Stimme überhaupt nicht zu“ zu „Stimme voll zu“) und Ausweichantworten „Ich weiß es nicht“ und „Keine Antwort“. Filterfragen wurden im Fragebogen gesetzt, um irrelevante Fragen zu überspringen und Konsistenz herzustellen.

Fragebögen eignen sich in der empirischen Forschung, um Daten mit vordefiniertem Ziel und Untersuchungsgegenstand zu erheben (Raithel, 2008). Hierfür wurden die Erkenntnisse aus dem Forschungsstand für diese Untersuchung in folgenden Themenbereiche im Fragebogen übertragen:

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<sup>1</sup> <http://www.dbb.de/dbb-startseite.html>

<sup>2</sup> <http://www.dgb.de/>

### 7.3.1. Einführung der E-Akte in Bundesbehörden

Der erste Teil des Fragebogens dient als Ausgangssituation, um zu erkennen, in welchem Stadium die Einführung der E-Akte in den befragten Bundesbehörden sich befindet, und um zu identifizieren, welche Organisationseinheiten bei der Einführung beteiligt sind. Hierbei wird die Einführung der E-Akte in Anlehnung an die in 7.2.2 beschriebenen Phasen unterteilt. Zum Einführungsstand der E-Akte wird untersucht, welche möglichen Auswirkungen die Einführung auf die Arbeit der Beschäftigten hat. Eine Beispielfrage dazu aus dem Fragebogen lautet „Die Beschäftigten in meiner Dienststelle fühlen sich für den Umgang mit der E-Akte qualifiziert“. Daraufhin wurde untersucht, ob und wann diese Auswirkungen von der Dienststelle thematisiert werden.

### 7.3.2. Beteiligung des Personalrats und der Beschäftigten bei der Einführung der E-Akte und die Bewertung der Beteiligung

Nach dem Stand der Forschung existieren verschiedene Möglichkeiten und Instrumente zur Beteiligung von Beschäftigten und/oder Beschäftigtenvertretern bei der Einführung der E-Akte. Welche davon genutzt werden, wann und wie wirksam sie sind, ist bislang offen. Der Fragebogen unterscheidet zwischen phasenübergreifenden Beteiligungsinstrumenten wie beispielsweise der Erstellung von Schulungskonzepten oder das Abschließen einer Dienstvereinbarung und phasenspezifischen Beteiligungsinstrumente wie beispielsweise der Beteiligung bei der Modellierung von Arbeitsprozessen, die üblicherweise vor dem Pilotbetrieb stattfinden soll. Eine Beispielaussage dazu aus dem Fragebogen lautet „Beschäftigte mit fachlichen Kompetenzen wurden bei der Gestaltung der neuen Arbeitsprozesse einbezogen“. Darüber hinaus werden auch explorativ weitere genutzte Beteiligungsinstrumente abgefragt und anschließend die Angemessenheit der Beteiligung bewertet.

## 7.4. Ergebnisse

### 7.4.1. Rücklauf und Demografische Daten

Die Feldphase fand vom 01.12.2016 bis zum 20.01.2017 statt mit einer Rücklaufquote von 28%. Von 181 Aufrufen des Links zur Umfrage haben 128 Personen an der Umfrage teilgenommen und 50 die Fragen bis zum Ende beantwortet. Durch die Filterfragen ergaben sich unterschiedliche Stichproben „n“, die explizit bei den Ergebnissen erläutert werden. Die Stichprobe setzte sich aus 72% Männer und 26% Frauen zusammen, von denen die Altersgruppe zwischen 50 und 59 Jahren am häufigsten vertreten war. Folgende Tabelle liefert

einen Überblick über die Zugehörigkeit zu Bundesbehörden und die Personalrat-Mitgliedschaft.

Table 20 Zugehörigkeit zu Bundesbehörde und Personalrat-Mitgliedschaft

<i>Bundesbehördenzugehörigkeit</i>	<i>Nennungen</i>	<i>Personalrat-Mitgliedschaft</i>	<i>Nennungen</i>
Oberste Bundesbehörde	13	Hauptpersonalrat	12
Geschäftsbereichsbehörde	22	Örtlicher Personalrat	32
Sonstige Behörden	11	Bezirkspersonalrat	7
Keine Antwort	2		7
Gesamt	48		51

Aus der Geschäftsbereichsbehörde stammen 22 der Befragten und 32 sind Mitglieder örtlicher Personalrat. Bei diesen Fragen waren Mehrfachantworten möglich, aus diesem Grund ist es möglich, dass beispielsweise örtliche Personalratsmitglieder auch im Hauptpersonalrat tätig sind. Zudem liegen bei dieser Studie keine Daten zur Grundgesamtheit vor, was Aussagen über die Repräsentativität der Ergebnisse erschwert.

#### 7.4.2. Einführungstand der E-Akte und die Beteiligten Organisationseinheiten in Deutschen Bundesbehörden

Im Hinblick auf die in 7.2.2 vorgestellten Phasen befindet sich die Einführung der E-Akte in den befragten Bundesbehörden in unterschiedlichen Phasen. Dabei sind 17% aus einer Stichprobe von n=85 in der Initiierungsphase, gefolgt von 5% in der Phase der Ausschreibung und Vergabe, Entwicklung und 7% im Pilotbetrieb. 21% arbeiten bereits regulär mit der E-Akte, wohingegen 15% angegeben haben, dass die Einführung in ihren Dienststellen zurzeit nicht geplant ist. 29% konnten den Einführungsstand nicht ermitteln. Verteilt auf die Bundesbehörden befindet sich der Einführungsstand der E-Akte in der obersten Bundesbehörde am häufigsten in der Initiierungsphase oder im Regelbetrieb und in der Geschäftsbereichsbehörde und in sonstigen Behörden ist die Einführung der E-Akte meistens derzeit nicht geplant. Unterschiedliche Organisationseinheiten sind bei der Einführung der E-Akte beteiligt. In den meisten Fällen sind IT, Organisation und Personal beteiligt, aber auch zusammen mit sonstigen Organisationseinheiten wie beispielsweise dem Personalrat, den betroffenen Abteilungen (Registrierung, Archiv), Datenschutzbeauftragten, Haushalt, Recht und Immobilien. Insgesamt war die IT-Organisationseinheit am häufigsten beteiligt.

#### 7.4.3. Mögliche Auswirkungen der Einführung der E-Akte und ihre Adressierung durch die Dienststelle

Mit der E-Akte ändern sich auch die Arbeitsabläufe, der Meinung waren fast alle Befragten mit mehr als 80% von 38 Antworten. In Bezug auf ihre IT-Kenntnisse fühlen sich mehr als 50% nicht qualifiziert, mit der E-Akte zu arbeiten. Die Aussage über die Entlastung durch die E-Akte fand von der Mehrheit keine Zustimmung, dagegen fühlen sich mehr als 50% durch die E-Akte belastet. Die Bewertung der Gebrauchstauglichkeit der E-Akte fiel mit mehr als 50% ‚teils-teils‘ nicht eindeutig aus. 20% halten die E-Akte für nicht gebrauchstauglich. Dabei bezog sich die Gebrauchstauglichkeit auf die Benutzerfreundlichkeit, Anforderungen an den Arbeits- und Gesundheitsschutz und die Ergonomie. Ein eindeutiges Ergebnis ist bei den Aussagen über die Rationalisierungseffekte wie Verlust des Arbeitsplatzes, Verlust an zwischenmenschlichen Kontakten und Zunahme der Arbeitsanforderungen zu finden. Fast die Hälfte der Befragten fürchten diese Rationalisierungseffekte durch die Einführung der E-Akte.

Anschließend an die Fragen zu möglichen Auswirkungen, die die Einführung der E-Akte auf die Arbeit der Beschäftigten in ihren Dienststellen hat, wurden Aussagen darüber getroffen, ob und wann (in welcher Phase der Einführung) diese möglichen Auswirkungen durch die Dienststelle adressiert werden. Sehr wenige (10%) gaben an, dass Rationalisierungseffekte und Belastungsempfinden an unterschiedlichen Zeitpunkten von ihren Dienststellen adressiert werden. Bei den anderen 90% wurden diese bis zum jetzigen Stand, zum Teil bis zum Regelbetrieb in ihren Dienststellen nicht adressiert. Über Qualifizierung und Gebrauchstauglichkeit wird eindeutig mehr kommuniziert (40%).

#### 7.4.4. Phasenübergreifende Beteiligungsinstrumente für Personalrat und Beschäftigte bei der Einführung der E-Akte und ihre Angemessenheit

Das am häufigste verwendete Beteiligungsinstrument ist die Bereitstellung von Informationen über die Einführung der E-Akte durch die Dienststelle. Von insgesamt 38 Antworten gaben mehr als 70% an, dass sie am häufigsten in der Initiierungsphase über die Einführung der E-Akte von ihren Dienststellen informiert werden, seltener in der Phase der Leistungsausschreibung und Vergabe oder in der Entwicklungsphase. Weitere genutzte Beteiligungsinstrumente sind die Festlegung der Beteiligungsmöglichkeiten und die Erstellung eines Schulungskonzeptes. Weniger genutzt werden die Auswahl von Multiplikatorinnen und Multiplikatoren für Schulungen, eine Dienstvereinbarung sowie eine formalisierte Beteiligungsvorlage.

Die Bewertung der genutzten Beteiligungsinstrumente ist vorwiegend positiv. Besonders auffällig sind die positiven Bewertungen der wenig genutzten Instrumente wie die Auswahl von Multiplikatorinnen und Multiplikatoren für Schulungen, eine Dienstvereinbarung sowie eine formalisierte Beteiligungsvorlage. Weniger positiv war die Bereitstellung der Informationen über die Einführung der E-Akte. 40% der Befragten halten sie für nicht hilfreich.

#### 7.4.5. Phasenspezifische Beteiligungsinstrumente für Personalrat und Beschäftigte bei der Einführung der E-Akte und ihre Angemessenheit

Für jede Phase der Einführung der E-Akte (von der Initiierung bis zum Regelbetrieb) wurden die genutzten Beteiligungsinstrumente zur Einbeziehung des Personalrats sowie der Beschäftigten und deren Angemessenheit abgefragt.

- In der Initiierungsphase gaben mehr als 50% von 38 Befragten an, dass der Personalrat Mitglieder in projektbegleitenden Arbeitsgruppen gestellt hat. Laut knapp 40% der Aussagen hat der Personalrat mit der Dienststelle die Beteiligungsmöglichkeiten in der Projektstruktur festgelegt. Knapp 50% sind der Meinung, dass die Dienststelle nicht dem Personalrat alle relevanten Informationen zur Verfügung gestellt hat. Die Angemessenheit der Beteiligungsinstrumente des Personalrats in der Initiierungsphase wurde von fast 50% der Befragten nicht für angemessen gehalten. Mehr als 50% halten die Beteiligungsinstrumente für Beschäftigten in dieser Phase auch nicht für angemessen. Das häufigste Beteiligungsinstrument für Beschäftigte in dieser Phase ist die Einbeziehung von Beschäftigten mit fachlichen Kompetenzen. Dagegen gab es kaum institutionalisierte Angebote wie z.B. Mitarbeiterportale, Wikis, eingesetzte Beratungsstellen, über die die Beschäftigte selbst Fragen zur Einführung der E-Akte stellen können.
- In der Phase der Leistungsausschreibung und Vergabe gaben mehr als 80% von 26 Befragten an, dass der Personalrat bei der Erstellung der Leistungsausschreibung nicht beteiligt wurde, keine Stellung zu den Ausschreibungsunterlagen wie z.B. dem Leistungsverzeichnis oder den Bewertungskriterien genommen hat, die Bieterpräsentationen nicht begleitet hat und bei der Vergabe kein eigenes Votum abgegeben hat. Die Angemessenheit der Beteiligungsinstrumente des Personalrats in dieser Phase ist mit 71% negativ ausgefallen. Die Beteiligungsinstrumente der Beschäftigten in dieser Phase wurden mit mehr als 80% für nicht angemessen gehalten. Sie beschränken sich auf die Einbeziehung von Beschäftigten mit fachlichen Kompetenzen bei der Erstellung der Leistungsausschreibung.

- Bei der Entwicklung der E-Akte gaben nur fast 30% an, dass der Personalrat bei der Gestaltung von neuen Arbeitsprozessen einbezogen wurde oder dass Änderungswünsche des Personalrats dabei berücksichtigt wurden. Während Beschäftigte stärker einbezogen werden in dieser Phase und ihre Beteiligungsinstrumente in fast 50% der Fälle für angemessen gehalten werden, fällt die Bewertung der Angemessenheit der Beteiligungsinstrumente des Personalrats mit 38% negativ aus.
- Im Vergleich zu den vorherigen Phasen werden im Pilotbetrieb mehr Beteiligungsinstrumente zur Einbeziehung des Personalrats und der Beschäftigten genutzt. Fast 80% von 29 Antworten gaben an, dass der Personalrat über Stand und Verlauf des Testbetriebs/Funktionstests informiert wurde, und fast 60% gaben an, dass sie einen Evaluationsbericht erhalten haben sowie ihre Zustimmung zum Pilot- bzw. Regelbetrieb eingeholt wurde. Mit 60% fällt die Angemessenheit dieser Beteiligungsinstrumente positiv aus. Noch angemessener werden die Beteiligungsinstrumente der Beschäftigten in dieser Phase mit mehr als 70% beurteilt. 90% gaben an, dass es eine Anlaufstelle für die Fragen der Beschäftigten gab, und 73% haben eine ausführliche Weisung über die Einführung der E-Akte erhalten. Auch eine Evaluation bzw. Checkliste oder Fragebogen für Beschäftigte gab es im Pilotbetrieb.
- Die Angemessenheit der Beteiligungsinstrumente zur Einbeziehung des Personalrats im Regelbetrieb der E-Akte ist von 60% für nicht angemessen erachtet worden. Es findet in dieser Phase fast kaum Beteiligung des Personalrats statt. 80% gaben an, dass sie neue Releases nicht getestet haben, und 70% sind der Meinung, dass es für den Personalrat keine Evaluationen bzw. Umfragen zum Regelbetrieb gab, anders als bei den Beschäftigten mit 60%. Zudem gaben mehr als 80% an, dass die Beschäftigte im Regelbetrieb eine Anlaufstelle für ihre Änderungswünsche und Feedback haben. Zusätzlich stehen EDV-Anwenderbetreuer für die Beschäftigten zur Verfügung. Dementsprechend wurden die Beteiligungsinstrumente zur Einbeziehung der Beschäftigten in dieser Phase mit 83% für angemessen erachtet.

## 7.5. Diskussion, Limitationen und Ausblick

Das Ziel dieser Studie war es, die Beteiligung der Beschäftigten und der Personalräte bei der Einführung von IT-Projekten in öffentlichen Verwaltungen zu untersuchen. Dafür wurde am Beispiel der Einführung der E-Akte in deutschen Bundesbehörden zuerst der Einführungsstand der E-Akte und die dabei beteiligten Organisationseinheiten identifiziert und ein Überblick über den Umgang mit möglichen Auswirkungen der Einführung auf die Arbeit der Beschäftigten gegeben. Auf Basis dieses Einführungsstands wurden zunächst phasenübergreifende und anschließend phasenspezifische Beteiligungsinstrumente des Personalrats und der Beschäftigten untersucht und ihre Angemessenheit bewertet. Die Einführung der E-Akte befindet sich in den Bundesbehörden in unterschiedlichen Phasen. Die meisten Behörden arbeiten bereits mit der E-Akte oder befinden sich in der Initiierungsphase. Beteiligt bei der Einführung der E-Akte waren verschiedene Organisationseinheiten. Am häufigsten war die IT-Organisationseinheit alleine oder in Zusammenarbeit mit anderen Organisationseinheiten beteiligt. Erstaunlich gering war die Beteiligung sonstiger Organisationseinheiten wie den betroffenen Abteilungen der Registratur oder des Archivs.

Darüber hinaus konnten viele Befragten den Einführungsstand nicht ermitteln, was an der Kommunikation über die Einführung der E-Akte in der Dienststelle liegen könnte. In diesem Zusammenhang wurden in dieser Studie auch die mit der Einführung verbundenen Auswirkungen auf die Arbeit der Beschäftigten untersucht und wie diese von der Dienststelle thematisiert werden. Die Gebrauchstauglichkeit der E-Akte konnten viele nicht einschätzen, was an dem entsprechenden Einführungsstand liegen könnte. Eindeutig sind dagegen die Aussagen über Qualifizierung, Belastung und Rationalisierungseffekte. Viele Beschäftigte fühlen sich nicht qualifiziert, mit der E-Akte zu arbeiten, und benötigen dafür die entsprechenden IT-Kenntnisse. Die angestrebte Effektivität und Effizienz der Verwaltungsarbeit durch die Einführung der E-Akte wird eher als belastend von den meisten Beschäftigten empfunden. Auch Rationalisierungseffekte werden durch die Einführung der E-Akte befürchtet. Im Hinblick auf die Adressierung dieser Auswirkungen ist der Umgang mit Themen wie Gebrauchstauglichkeit und Qualifizierung deutlich offener als mit sensiblen Themen wie Belastungsempfinden und Rationalisierungseffekten. Nicht nur die Information ist ein Teil der Beteiligung, sondern auch die Kommunikation (Marchington & Wilkinson, 2005). Aus dieser Perspektive könnte eine offenere Kommunikation über die Einführung von IT-Projekten und die damit verbundenen Auswirkungen die Befürchtungen der Beschäftigten mildern und ihre Abneigung gegenüber neuer IT-Systeme reduzieren.

Bei der Beteiligung des Personalrats und der Beschäftigten bei der Einführung von IT-Projekten ist Optimierungspotenzial vorhanden. Die Ergebnisse zeichnen ein homogenes Bild über die Beteiligung des Personalrats selbst und die Beteiligung der Beschäftigten bei der Einführung der E-Akte in den Bundesbehörden. Die Beteiligungsmöglichkeiten waren insgesamt in den meisten Phasen begrenzt, und die genutzten Beteiligungsinstrumente wurden überwiegend als unangemessen wahrgenommen. Insbesondere in der Phase der Leistungsausschreibung und Vergabe findet fast kaum Beteiligung statt, aber auch in der Initiierungsphase besteht großer Nachholbedarf. Dabei haben sich selten genutzte Beteiligungsinstrumente wie beispielsweise die Festlegung der Beteiligungsmöglichkeiten oder die Auswahl von Multiplikatorinnen und Multiplikatoren für die Schulung, aber auch die Bereitstellung relevanter Informationen über die Einführung als nützlich erwiesen. Dies deutet darauf hin, dass durch eine verstärkte Nutzung solcher Beteiligungsinstrumente eine höhere Zufriedenheit erzielt werden kann.

Die erhoffte Akzeptanz durch die Beteiligung von Beschäftigten bei der Einführung von IT-Projekten in öffentlichen Verwaltungen könnte nicht am Mangel existierender Beteiligungsmöglichkeiten, sondern eher an deren Nutzung scheitern. Ein prominenter Ansatz der IT-Akzeptanzforschung ist das Technologie-Akzeptanzmodell (TAM), das den Einfluss von wahrgenommenem Nutzen und wahrgenommener einfacher Benutzbarkeit auf die Einstellung gegenüber der IT-Nutzung zeigt. Eine stärkere Einbeziehung des Personalrats und der Beschäftigten im Einführungsprozess insbesondere in den früheren Einführungsphasen durch beispielsweise Beteiligung bei der Erstellung der Anforderungen, Gestaltung der Arbeitsprozesse oder Testen der Gebrauchstauglichkeit könnte solche Faktoren positiv beeinflussen und somit zu höherer Akzeptanz führen.

Diese Studie weist Limitationen auf. Die Ergebnisse dieser Studie können auf Grund der geringen Stichprobe zum einem und der Tatsache zum anderen, dass Einschätzungen des Personalrats über die Meinungen der Beschäftigten eingeholt wurden, nicht generalisiert werden. Zudem wurden auf Grund des Zuganges nur Bundesbehörden bezogen. Zukünftige Forschung könnte sich mehr auf Landes bzw. Kommunale Ebene fokussieren, Beschäftigte direkt befragen und über weitere Kanäle versuchen eine größere Stichprobe zu erzielen. Ebenfalls interessant wäre es, den Zusammenhang zwischen Beteiligung und IT-Akzeptanz der Beschäftigten zu untersuchen, da diese Beziehung bislang kaum empirisch untersucht wurde.

8. Exploring the Role of Participation in Government Employees' Adoption of IT: A Qualitative Study of Employees' Participation in the Introduction of the E-File in Germany

<b>Title</b>	Exploring the Role of Participation in Government Employees' Adoption of IT: A Qualitative Study of Employees' Participation in the Introduction of the E-File in Germany
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<b>Abstract</b>	Employee participation in IT projects is considered to be a critical IT adoption factor in the public sector. However, research into the impact of participation on government employee adoption of IT is very limited. Therefore, this study investigates the role of participation in government employee adoption of IT. A qualitative research study was carried out and project managers were interviewed. Additionally, employees who participated in the introduction of the e-file in Germany were also interviewed. The findings reveal that information and communication, training and support, and active participation in project groups, the formal participation of the staff council and the exchange of experiences between governmental agencies all have a potential positive impact on government employee adoption of IT. However, managers have key positions in this context. Furthermore, barriers to participation, such as the lack of resources as well as a lack of willingness and qualifications, are also discussed.
<b>Keywords</b>	Adoption, Employee, Government, IT, Manager, Participation



# **Exploring the Role of Participation in Government Employees' Adoption of IT: A Qualitative Study of Employees' Participation in the Introduction of the E-File in Germany**

## **8.1. Introduction**

The public sector worldwide is increasingly confronted with digitalisation projects. The success of information technology (IT) projects in the public sector depends strongly on the adoption of this technology, not only on the customers' side, but also within the public sector (Cappemini et al, 2010). The low usage by end-users is still one of the major expansion barriers to e-government projects. In particular, maladapted staff threaten the chances of IT projects becoming successful (Weerakkody, 2012). The introduction of the electronic file, or "e-file" (also known as the electronic document management system EDMS), is one of the most critical intergovernmental IT projects worldwide and can be interpreted as "electronic- the use of modern information technologies; document- a set of information pertaining to a topic, structured for human comprehension, represented by a variety of symbols, stored and handled as a unit; and management, retrieval, manipulation, update, and eventual disposition of documents to fulfill an organizational purpose" (Abdulkadhim, Bahari, Bakri, & Ismail, 2015, p.422). It deals with the creation, capturing, modification, storage, archiving and the transfer of electronic documents and should help governments increasing the efficiency of their internal processes on the one hand and supporting the external communication processes with citizens on the other hand (Kunis, Runger, & Schwind, 2007).

German government agencies are legally required to implement the e-file and to achieve a paperless state at all three administrative levels. The implementation of such inter-jurisdictional e-government projects presents a big challenge for many countries (Abdulkadhim et al., 2015). The scope of such projects make them uniquely challenging not only in terms of the technical, fiscal, and political dimensions, but especially managerial and human challenges hinder the implementation of such systems ((Al-Hashimi et al., 2017; Distel, 2016). Staff and leadership resistance to change is one of the main factors affecting the implementation of the e-file in the public sector worldwide (Abdulkadhim et al., 2015). According to (Distel, 2016) the success of the implementation of e-file in Germany depends to a large extent on the usage behavior of the administrative staff. Studies on the e-file adoption in the public sector were focusing upon technological factors such as the perceived usefulness and ease of use of the system (e.g. (Hung et al., 2009)) and the efficiency of the used tool from an implementation perspective (e.g.

(Ejlertsson, Gustafsson, Hagman, Hellgren, & Ullman, 2011)). Several studies have advocated for employees' participation in the IT introduction process in the public sector and view it as a critical adoption factor in this sector (e.g. (Nurdin et al., 2010; O'Brien, 2002)). However, most of these studies have focused on the broader, strategic view of participation as a new public management approach to achieve change in organizations (O'Brien, 2002) and to meet strategic e-services goals (Karlsson et al., 2012). Employees who participate in the change process in an organization are more likely to support this change and continue to use the system that has been introduced (James Roughton, 2015). This is a familiar pattern in Human-Computer Interaction (HCI) research, especially in participatory design. Participation as an acceptance strategy can replace the conventional top-down approach used for the IT implementation process in the public sector (O'Brien, 2002). In practice, however, employees' participation in IT projects in the public sector is a poorly used tool (Ben Rehouma, 2018). The authors of (Holgersson et al., 2018) encourage researchers and practitioners to consider research questions such as: How should users participate in IT projects in the public sector? What should be achieved with user participation? To fill this gap, we address the following research question: "How does government employees' participation impact their adoption of IT?" We aim with this study to advance the research field in this area by investigating the role of government employees' participation in IT projects in their use of this technology. In order to achieve this goal, we conducted a qualitative study using semi-structured interviews of 11 government employees who were involved in the introduction of the e-file to German government agencies.

Section 2 provides an overview of employees' participation and IT adoption research concerning the public sector. The research methodology of this study is described in Section 3. Section 4 presents the findings, which are followed by a discussion in Section 5. Finally, we conclude the study in Section 6 and outline limitations and future research.

## 8.2. Related Work on Employee Participation and IT Adoption in the Public Sector

Employee participation is a broad concept which has been a core topic in a range of research fields. Therefore this terminology is defined considerably differently depending on the area of research. In the literature, the term "participation" is often intertwined with the term "involvement". Barki & Hartwick (1989) separated the two constructs and defined user participation as "a set of behaviors or activities performed by users in the system development process" and user involvement as "a subjective psychological state reflecting the importance and personal relevance of a system to the user." Heller, Pusic, Strauss, and Wilpert (1998, p. 6)

describe participation with the interaction of people with each other in an organizational context, embracing a range of behavior and choices. This definition embraces the access to information and to the process of decision-making. A further definition of participation refers to “the range of mechanisms used to involve the workforce in decisions at all level in organization, whether undertaken directly with employees or indirectly through their representatives.” (Wilkinson, Gollan, Marchington, & Lewin, 2010, p. 9).

User participation takes many forms and can occur at many levels. Users may participate formally via formal groups and teams and holding discussions in official meetings or participate informally through relationships, discussions and tasks (Cavaye, 1995). The different levels of participation refer to the amount of responsibility assigned to an individual during their participation and can vary between serving in an advisory capacity, having sign-off responsibility, being part of a team and having full responsibility (Cavaye, 1995). Marchington & Wilkinson (2005) deconstructed participation into an escalator, in which employees can participate in an informative, communicative, consultative manner or even with codetermination and control. According to (Marchington & Wilkinson, 2005), employee participation can be categorized into five areas: downward communication, upward problem solving, vertical task-based participation, team work and self-management. Downward communication ranges from formalized written documents sent to all employees to face-to-face interactions between line managers and their staff. Receiving information directly from management and open communication about new developments within an organization are important basics in this category. Upward problem solving comprises resolving problems and new ideas suggested by individuals or groups. Vertical task-based participation revolves around training, managerial and supervisory responsibilities. The last category incorporates responsibility for a completed task, working without direct supervision and encouraging team members to organize and utilize multiple skills.

The concept of participation within participatory design approach (PD) has been core topic of research since the 1960s (Markus & Mao, 2004). Research on participation in PD contains evidence of the importance of user participation in the decision making process, when they are affected by this decision or change (Ben Rehouma, 2019). Indeed, a good design implies the participation of the intended users in technology design (Kensing & Blomberg, 1998). This requires an exchange of knowledge between designers and workers, access to relevant information, the possibility of taking an independent position of the problems, participation in decision making, the availability of appropriate participatory development methods, and room

for alternative technical and/or organizational arrangements (Kensing & Blomberg, 1998). PD emphasizes democratic participation, where users participate, in particular by analyzing the organizational requirements and by planning appropriate structures to support both individual and organizational needs (Kujala, 2003). Typical methods used for participation in this context are workshops and prototyping.

Studies on participation in information system research highlights the importance of the affected stakeholder (Markus & Mao, 2004). While stakeholders are all those who are affected by a solution, participants are described as a “subset of stakeholders who are actually given the chance to participate in solution development and/or implementation activities” (Markus & Mao, 2004). Participants can have different employee status, such as being operational or managerial personnel or of different managerial ranks, have different IT skills, and be members of different stakeholder groups (Markus & Mao, 2004).

The process of introducing IT in the public sector is complex due to the different stakeholders involved in this process (Patanakul, 2014; Rosacker & Rosacker, 2010; D. W. Wirick, 2009). Axelsson, Melin, & Lindgren, (2013) argued that it is necessary to address the notion of stakeholder participation in any e-government project. They have examined how the involvement of stakeholders in e-government projects influences the stakeholders’ attitudes towards this project and have recommended the investigation into more cases with additional stakeholders. The authors in (Karlsson et al., 2012) showed how user participation approaches can meet strategic e-services goals, and found that it is important to consider the user target segment, the nature of participation and the presence of adequate skills when choosing among participation approaches. Employees’ participation in the public sector should increase employees’ technological skills and hence their readiness to use IT (Hu et al., 2003; Hung et al., 2009). Usually, the use of IT in the public sector is a mandatory requirement. Nevertheless, IT adoption research deals primarily with users’ behavioural intentions regarding a given system and their attitudes towards IT, which influence their actual use of this system. These determinants of IT adoption are used in the Technology Acceptance Modell (TAM) (Davis, 1986) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Viswanath Venkatesh et al., 2003), which have their origins in the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980) and the Theory of Planned Behaviour (TPB) (Ajzen, 1991). Attitudes towards an object refers to the degree to which a person has a favorable or unfavorable reaction towards this object. Davis (1986) introduced two constructs, perceived usefulness and perceived ease of use as primary antecedents of users IT acceptance. Perceived usefulness refers

to “a person’s subjective probability that using a specific application system will increase his or her job performance within an organizational context”, and perceived ease of use to “the degree to which the user expects the target system to be free of efforts” (Davis, Bagozzi, & Warshaw, 1989, p. 985). According to TAM, a person’s attitude toward using a given system is determined by his or her perceived usefulness and ease of use of this this system. Although most research on IT adoption has focused on the technological factors influencing users’ adoption of IT, such as perceived usefulness and perceived ease of use, the authors of (Ben Rehouma & Hofmann, 2018) recommend a deeper investigation into individual, managerial and organizational factors that influence government employees’ adoption of IT. Those factors include, for instance, participation, information, communication flow, training and education.

### 8.3. Method

#### 8.3.1. Research Design

The purpose of this research study is to explore the role of government employees’ participation in IT projects in their adoption of this technology. A qualitative approach to this study is suitable, especially in view of the fact that this research area has hitherto been under-investigated. Qualitative research is done in natural environments and interprets phenomena based on the meaning and value people give to the questions asked (Alvesson & Sköldbberg, 2018). A semi-structured interview is the most common qualitative research method, and it is often argued that it is the most effective and convenient means of gathering information (Qu & Dumay, 2011). This method requires the preparation of interview guidelines on the basis of identified themes. The interview guidelines should help to direct the interview towards the topics of interest (Qu & Dumay, 2011). Based on the related work discussed above, interview guidelines were developed for each stakeholder group which included primary questions about their experiences in participating in the introduction of the e-file, the implications of participation, the impact of participation on their adoption of the e-file and further adoption factors.

#### 8.3.2. Data Collection

The German governmental system is divided into three levels: the federal level, the state (Länder) level and the local level. The local level in Germany is a concern of the state level. In total, there are 16 different local government settings, with three of them having the status of a state and local government at the same time. To obtain access to project managers and

employees in government agencies who were involved in the introduction of e-files, we contacted the central government department responsible for digitalisation within a city-state of Germany. In doing so, we received contact information for the project manager responsible for the introduction of e-files to all government departments at the state level, who then gave us access to the interviewees. The government departments in this state have, in total, approximately 25,000 employees. Of the 25,000, 5,000 are, or should be, direct users of e-files. The interviewees' departments included the Senator of Finance, the Senator of Justice, the State Chancellery and the Social Welfare Office. The interviews took place in April 2018. In total, 11 interviewees participated in this study. Three of the participants were project managers, four were employees participating in the introduction of e-files to their agencies and all participants were intended users. The sample included a total of nine female and two male interviewees. The interviews were recorded and transcribed anonymously via the f4-Tool. Each interview had an average duration of 30 minutes.

### 8.3.3. Data Analysis

Since this study is exploratory in nature, we used qualitative content analysis. Qualitative content analysis is generally used in studies to develop theories or to build a model or concept and aims to provide knowledge, new insights, a representation of the facts and a practical guide to action (Elo & Kyngäs, 2008). According to (Mayring, 2000) it is “an approach of empirical, methodologically controlled analysis of texts within their context of communication, following content analytical rules and step by step models, without rash quantification.” This method follows a number of procedures to fulfil reliability and validity criteria. The analysis process may follow a deductive or inductive approach. We followed the deductive approach in this study for the development of the interview guidelines, as described in Section 3.1. We developed a coding scheme via generating categories from the theoretical backgrounds of the broad topics in our research question. These categories included mainly participation activities, the impacts of participation in the adoption of e-files and further adoption factors. In the next step, we coded the text (transcripts) according to these categories and occasionally (when an appropriate category was not found for a text segment) followed the inductive approach and developed new categories based on this data (e.g. barriers to participation). To ensure the reliability of our coding, it was done separately by two experienced researchers. The coding took place in June 2018. Finally, we evaluated the findings according to related works and explored the possible relationships between government employees' participation in IT projects and their IT adoption. In addition, we identified further important factors influencing

government employees' adoption of IT as well as barriers to participation. To support our content analysis, we used the software MAXQDA version 12.

## 8.4. Findings

### 8.4.1. Participation Activities and Their Role in Government Employees' Adoption of IT

The results showed clearly the importance of employees' participation in IT projects for their adoption of this technology. Employees' adoption issues were not taken into account when IT projects were introduced in the public sector. As a result, IT projects failed from lack of use. A project manager stated: "We just had an implementation project that failed because of lack of use." E-file adoption proceeded satisfactorily since employees' participation was taken into account. The same project manager noted: "Acceptance is a topic which I believe we have neglected very much and which I personally also underestimated. We have set up a subsequent implementation project, [...]. Of course, we have also dealt with the issue of acceptance in a different way." In addition to the assumed technological factors, employees' participation in IT projects is one important way to achieve the intended use of the IT which has been introduced in the public sector. One interviewee, for example, stated how critical participation is for his or her adoption of the introduced system: "The more I'm involved in the run-up, the more I'll accept the system." The interviewees also reported on their experiences with participation in the introduction of e-files. These activities included information and communication, training and support, active participation in project groups, the participation of the staff council and the exchange of experiences.

**Information and Communication:** One the most simple and important ways to involve employees in IT projects in the public sector is to inform and communicate with them about the technology to be introduced and the technological and organizational challenges related to it. All interviewed project managers agreed on that point. This point was not always as self-evident as it is today. Hardly any public relations work related to informing employees about the introduction of IT in their departments was done in the past. Public relations is concerned with information, and communication is now one of the main measures used to achieve government employees' adoption of IT. For example, one interviewed project manager stated: "One simple and effective way to achieve acceptance by our employees is to inform them about the new system and to communicate with them about it. They should be aware of the benefits of the use of this system as well as how to overcome challenges related to it." Project managers arrange information events, workshops and send newsletters to disseminate information about new

technology and are now much more focused on having a presence on the intranet. Such “simple” measures are underestimated, but they still show great impact on employees’ awareness about what is going on in their agencies, as one interviewee stated: “We get a lot of positive feedback and inquiries.” Although informational events are intended to reach most employees, in many cases, employees are informed about the introduction of IT by their colleagues and line managers. Responses supporting these results include: “Until now, we have received information by our line manager.” and “We were informed both by employees as well as by our superiors.” In addition, communication with the line managers about the upcoming changes seem to be favoured. One of the interviewed employees, for instance, expressed their preference for the communication to come from their line manager: “I would like to get some information from my team leader about what the e-file is.” While project managers try hard to keep communications open, they do not always succeed, as noted by some of the interviewed participants: “There is no instruction or something like how to handle the e-file, there is partly uncontrolled growth.” Line managers should not only inform their employees about the introduction of IT, but also actively communicate with them about challenges related to it.

**Training and Support:** Other important participation activities in the public sector are providing customized training and individual support for the system which has been introduced. The results indicate that standard training which take place long before the regular operation of the system is not enough. In addition, support in one’s own office and at one’s own desk is essential for reducing fears and reluctance. Generally, every employee participates in a standard training for about two days. Most employees encounter e-files for the first time during the training course. For example, one interviewed employee stated: “On the first day of training is where we get the first information about this topic.” Interviewed project managers and employees agree that a standard two-day training session is not enough. There is a need for more instruction, such as more days of training, advanced and needs-oriented courses and workshops for special issues. For example: “For my qualification, I would have preferred more days of training”, and “We would like to get advanced courses.” In addition, much of the training which does take place occurs long before the introduction of the IT and is consequently useless. For example, one interviewee stated: “Unfortunately, the fact that this often does not follow directly, it was all a waste of time.” Government employees see training as critical for overcoming both the technical and organizational challenges presented by IT in the work context: “The training is not only about technical issues but also about organizational changes for daily work.”

Furthermore, support in one's own office and at one's own desk is one of the most important measures for reaching employees who have problems using IT. Managers actively communicate this issue in their departments to identify support needs. Employees who are more resistant to IT and have more difficulties with the use of IT need particular support. Such support includes identifying and discussing problems as well as support at one's own desk. For example, one interviewed project manager stated: "Go into the offices, into the teams, and then ask something like: "Where are the problems?" Conduct more conversations, discuss problems, identify difficulties, proceed step-by-step and practice the processes together on their PC."

Active participation in project groups: The complexity of the organizations in the public sector claims the participation of steering committees and "on-site" project groups in the introduction of IT projects. On-site project groups react to individual needs in their departments, transmit information between steering committees and sub-stakeholders and involve employees in decision-making processes. Providing project managers on-site within the concerned departments is considered an effective measure for proceeding with the project. One response, for example, supporting these results is: "The central department cannot exert influence on the departments and that is why they have found a sub-project manager in the department who undertakes this on-site." The overall project group serves as a steering committee and includes project managers as the representatives of the department involved. The project managers have an overview of the projects in their departments and inform the employees about participation activities in each department such as training opportunities and support for the system being introduced. For example, one project manager stated: "We distribute the protocols of our meetings; we inform employees in each office that they should go to training, and we do workshops." Departments where participating employees work closely with project managers in project groups are more advanced in their implementation of IT and report higher adoption by their employees: "The participation in our department is good. [...], because we work very closely together." Project managers and participating employees are available for any questions about the introduction of IT in their departments; they advise employees and try to solve their problems: "We actually take up every question." Employees participate in project groups in different ways. They transmit employees' individual needs, provide feedback concerning the system being introduced, test new system releases and try to influence the decision-making process. For example, one interviewee stated: "Employees express their needs, this goes around the project group, and then to the steering committee, where they decide about it."

The role of staff council: The formal participation of the staff council in IT projects in the public sector is considered to be a critical factor in getting employees to adopt IT. To reach all employees, it is important to involve the staff council since it is the employees' representative in the IT introduction process. The staff council takes part in important decisions and relays employees' concerns in this context. Some statements supporting this are: "Formal participation of the staff council and other committees, then the acceptance is in any case higher. I'm quite sure of that", "It is recommended that the staff council join the meetings of the project groups to represent all of the employees.", and "I consider an individual participation to be critical, but a contribution via the staff representation committees to be very important."

Exchange of experiences: A further participation activity applied in the public sector is the exchange of experiences between departments and agencies. Such exchanges help to provide an overview of the positive and negative aspects affecting the adoption and success of IT projects. All managers and participating employees supported the importance of exchanging experiences and strongly recommended it for future projects. Some interviewees stated: "I strongly recommend the exchange of experience between government departments. It should help to obtain feedback about the IT introduction process in other departments and to learn about applied success and adoption factors", "Through the participation of committee meetings of project managers from different departments, an exchange of experiences takes place, an exchange with others, giving feedback about the system" and "An agency has also provided a newsletter. We have practically copied that from them and then applied it in our project."

#### 8.4.2. Barriers to Participation

In addition to the activities involved in participating in IT projects in the public sector and their impact on employees' adoption of IT, we have identified barriers to participation, including the lack of personnel and of willingness and qualifications.

Lack of personnel: One of the greatest challenges when planning participation in the public sector is the lack of personnel. The lack of personnel negatively influences the progress in IT projects and leads project managers to feel overstrained. Most government agencies have no personnel to devote to managing their IT projects and give project management responsibilities to employees in addition to their daily work. Such projects often involve a massive change in job structure and require a lot of time and special qualifications. One interviewee, for example, stated: "One challenge was that very few agencies hired separate personnel for the introduction of e-files, but they gave it to many people in addition to their present workload, which was

really a massive change that didn't work." On the contrary, agencies where personnel were available to manage the introduction of IT reported successful progress in their projects: "The agencies that have allocated a person who can solely take care of it have made good progress."

Lack of willingness and qualifications: In addition to the lack of personnel, the lack of willingness and qualifications to participate is a further challenge facing participation in IT projects in the public sector. It is a big challenge to acquire suitable personnel with the appropriate skills and who are willing to participate. It is not enough to find an individual to manage or participate in IT projects if she or he does not wish to participate or lacks the appropriate qualifications to do so. One interviewee described this challenge as follows: "It is not easy to find people who are willing to do this and who are able to do it too."

#### 8.4.3. The Role of Manager as an Important Factor Influencing Government Employees' Adoption of IT

Clear announcements from managers: The responses received from the interviewed project managers about further adoption factors beyond participation were unexpected. Participation was indeed identified as an important and critical adoption factor influencing government employees' adoption of IT. Nevertheless, all interviewed project managers argued that a top-down approach with a clear announcement from the manager is a more important factor in this context. A statement describing this relation is: "First clear announcements from the manager, then participation." Based on the majority of responses from the project managers, the use of IT in the public sector can be achieved only by first utilizing a top-down approach and then utilizing participation. For instance, a project manager stated the following: "I believe that top down must be there in any case. From the moment in which this announcement is given, we can also immediately begin with participation." The use of new technologies is a change that is expected in the public sector. Managers bear the responsibility of communicating openly and clearly about this expectation. One response, for example, supporting these findings is: "This is what we expect now, and we want to proceed like this."

The exemplary function of managers: The role of a manager is not limited to clear announcements about the expected use of the system being introduced. Line managers in the public sector have an exemplary function and should be role models in using IT. They should go to training courses and use the system themselves. They should incorporate management measures such as ensuring the use of IT in their departments as well as setting standards and rules and making sure they are followed. For example, some interviewees stated: "The

supervisors have to say: so now we work like this with the e-file and you don't have to send me anything by email anymore, but only via e-file, and have to make sure that this is done" and "Managers are such a tiresome subject. For them, we offer separate training courses and say again how important it is that they set standards, that they set rules, that they demand rules are adhered to." In practice, managers do not fulfil an exemplary function: "The first one who doesn't use it is the supervisor. This has less to do with qualifications than with rules for cooperation." Managers' attitudes towards IT is a further aspect to consider when specifying the exemplary function of managers in the public sector. The positive attitude of line managers towards a new IT system is a critical adoption and success factor in the public sector. For instance, one interviewed project manager stated: "The more positive the team leader's attitude toward the e-file, the more positive is the development of the e-files and all around it. That is just how it is."

### 8.5. Discussion

Our investigation into the role of government employees' participation in IT projects for their adoption of IT is in line with previous studies arguing that participation is a critical adoption factor in this sector. Our findings present the overall positive impact of government employees' participation in IT projects on their IT adoption and reveal that the role of managers is more important than participation in this context. To answer our research question as to how government employees' participation impacts their adoption of IT, our analysis identifies different activities of participation, such as information and communication, training and support, active participation in project groups, the formal participation of the staff council and the exchange of experiences, and shows how critical these activities are for the use of IT in the public sector.

Information and communication measures are not restricted to formal measures such as the arrangement of information events or the sending of newsletters but especially imply the active communication between line managers and their employees, and in particular the face-to-face interactions. Receiving information directly from management and open communication about new developments in the organization are important basics in direct participation (Cats-Baril, William Thompson, 2016). Users' individual perceptions of being informed as well as the IT-relevant details and the communication channel used for spreading the information are important factors influencing the use of IT and warrant more attention in IT-adoption research in the public sector (Muneera & Didar, 2015). Informing potential users and communicating with them about

the benefits of the system being introduced is one major strategy for overcoming their negative attitudes towards this system (Aladwani, 2001).

In addition, our findings reveal that training and support are also important participation activities, which influence government employees' adoption of IT. We argue that training should be customized to meet employees' individual needs and should take place shortly before the introduction of IT. Prior research has demonstrated the positive effect of intensive training programs on users' intentions to accept a program (Hu et al., 2003), and that training in the form of users' support is a significant determinant of government users' attitudes towards a system (Hung et al., 2009). Especially support in one's own office and at one's own desk should help reluctant employees to handle the new system. Training and support are necessary basics needed to ensure continued acceptance (Hu et al., 2003) and belong to the set of main management interventions which influence the acceptance of technology since they influence the shared beliefs regarding the benefits of this technology (Amoako-Gyampah, 2007). The benefits accrued through user participation on system satisfaction and user system acceptance depend on the degree or the level of the participation (Muneera & Didar, 2015). Whereas, the informative participation of users is limited to providing or receiving information, users can participate in a consultative or representative manner, allowing them to influence the decision-making and system design processes (Muneera & Didar, 2015). Active participation in "on-site" project groups, helps reacting to individual needs in their departments, transmitting information between steering committees and sub-stakeholders and involving employees in decision-making processes. User participation in decision making, steering committees, work groups, and system design activities are common participation methods used in participatory design (Kensing & Blomberg, 1998). Since the participation of all employees in IT projects is not possible, it is essential to involve representatives from the full range of users (Rasmussen et al., 2011). This study asserts that the participation of the staff council plays a key role in reducing resistance to IT-related changes among civil servants. The staff council is an institutionalized organizational member who can influence the decision making process. Previous research reported on lack of participation of the staff council in IT-projects in the public sector and appeal to make much greater use of such opportunities for participation (Ben Rehouma, 2018). A further participation activity identified in our findings is the exchange of experiences. The exchange of experiences between different projects groups, departments, or agencies helps learning from each other through the exchange on successful or even failed projects. The capacity to exchange, transfer and share knowledge is a key factor in social and economic success (Bolisani, 2008). This is also in line with the observability component of the Diffusion of Innovation Theory (DOI), which

describes the characteristics that determine an innovation's rate of adoption (Rogers, 1995). In (Rogers, 1995) Rogers describes observability as the degree to which the results of an innovation are visible to others.

In addition, our findings include barriers to participation and highlight the challenges associated with the lack of personnel as well as the willingness and qualifications to participate. Previous studies reported on several barriers hindering user participation such as legal constraints, available resources, and competencies (Holgersson et al., 2018). The negative effect of low personnel on the decision to use IT is one important aspect in this context (Hofmann, 2014). Furthermore, as highlighted by (Cats-Baril, William Thompson, 2016), it is critical to have a project leader with specific responsibilities for managing IT projects in the public sector. This research argued that it is impossible to succeed without project leaders with the necessary skills for managing IT projects in the public sector. Further aspects discussed in the literature as main factors enabling or hindering participation in IT projects include users' abilities and willingness to participate as well as top management awareness and support (Thakurta, 2017). Our analysis is consistent with these findings and reveals that the role of the manager is an important factor influencing government employees' adoption of IT. In fact, it is considered to be more important than employees' participation. Managers should make clear and direct announcements about their expectations. Furthermore, they should be role models in using IT, exhibit exemplary function with their positive attitudes towards using IT in their agencies, and apply management measures to ensure the use of IT in their departments. Leadership via traditional, top-down and hierarchical approaches is obsolete today. The style of leadership used in organizational change has shifted to a more open, participatory management style (Graetz, 2000). However, leaders exhibiting strong leadership and high responsibility facilitate the success of e-government projects (Rao Baliwada & Jayaram, 2014). The role of a strong leadership, which control the project in all level of implementation is significant for a successful implementation of e-file (Abdulkadhim et al., 2015). Training, the formation of user groups, formal announcements, testimonials and managerial support are examples of mechanisms which support forming relationships between users' initial attitudes towards a system and their perceptions of the usefulness of this system (Brown et al., 2002). Existing literature on leadership in the public sector has argued that managers' pro-innovation characteristics and attitudes influence the adoption of an innovation (e.g. (Fariborz Damanpour & Schneider, 2008; Koo, Wati, & Jung, 2011)). Using their personal adoption of IT, leaders can not only improve their effectiveness in using IT but also be role models as direct users (Van Wart et al., 2017).

## 8.6. Conclusions, Limitations and Outlook

The use of IT in the public sector depends strongly on employees' adoption of IT. Employees' participation in IT projects in the public sector is argued to be a critical factor in achieving the expected use of the system being implemented. However, very few studies exist that deal with the relationship between participation and adoption of IT in the public sector. Using a qualitative approach with semi-structured interviews, we explored such relationships and assessed the impact of government employees' participation on their adoption of IT during the implementation of e-file in German government agencies. A set of activities included in participation was analysed in this study. We concluded that information and communication, training and support, active participation in project groups, the formal participation of the staff council and the exchange of experiences between governmental agencies all could have a positive effect on government employees' adoption of IT. We have identified barriers to participation such as the lack of personnel as well as willingness and qualifications. Furthermore, we identified that the role of managers is an additional critical factor influencing government employees' adoption of IT in the public sector. Our findings can serve as basic for further empirical research, especially in terms of investigating the influence of participation activities on IT adoption. Practitioners can use our findings to advocate for participation in IT projects in the public sector and show the possible benefits of the activities used.

This research study has several limitations. First, our findings are not generalizable across the whole public sector because the study was conducted in only one state in Germany. Future research could be conducted in additional states (and additional countries) with a wider range of stakeholders and test our findings empirically. In addition, we recommend researchers to deeper investigate further individual, managerial and organizational factors influencing the adoption and success of such inter-jurisdictional e-government projects. A further important discussion point for future research is the impact of public sector managers on their employees' adoption of IT.



## 9. Investigating Change Management Based on Participation and Acceptance of IT in the Public Sector: A Mixed Research Study

<b>Title</b>	Investigating Change Management Based on Participation and Acceptance of IT in the Public Sector: A Mixed Research Study
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<b>Abstract</b>	<p>The digitalization of public administrations faces big challenges regarding employees' acceptance of IT. Change management approaches based on participation should help achieving acceptance and success of IT projects in the public sector. Our research investigated how participation methods can be integrated into change management and which effects participation has on the acceptance of the changed processes and application systems in this sector. We followed a mixed research approach and conducted a quantitative and a qualitative study within public administrations and ministries in two states in Germany. Our findings reveal that employees' participation in the form of information, communication, training, support and active participation as well as the manager role in terms of their exemplary function and application of management measures such as motivating and supporting all have a significant positive linear relationship with employees' attitudes towards IT. Furthermore, we identified four key aspects of applying change-management based on employee participation in IT-projects: (1) Definition of a participation framework and suitable methods in the project initiating phase; (2) Selection criteria of employee participation methods; (3) Utilization of established methods; and (4) Establishment of an information dissemination plan, which we recommend to consider when implementing IT projects in the public sector in the future.</p>
<b>Keywords</b>	Acceptance, Change Management, Digitalization, Participation, Public Administration



# **Investigating Change Management Based on Participation in the Public Sector: A Mixed Research Study**

## **9.1. Introduction**

Public administrations in Germany are undergoing a structural and technological change. The strategy and several measures for managing this change are defined within the e-government act (EGovG) and the online access act (OZG) of the federal government, as well as in the jurisdiction of the individual federal states. Currently the online access act contains 575 public administrative processes that have to be changed, in order to modernize and digitalize the German public administrative system. A key action for managing these changes is the process assessment and the subsequent optimization of administrative business processes. This can be seen as a prerequisite for a full digitalization of government processes. Based on these legally binding changes, the work routines of administrative staff will also change as a result of rising restructuring activities. Digitalization changes such as these present a considerable challenge for public administrations (Van der Voet, Kuipers, & Groeneveld, 2016). The implementation of these changes in the form of IT projects should ideally focus on the fulfilment of the requirements set by the e-government act, but should also consider the affected employees. However, employees' resistance to change is still one of the major problems facing the implementation of IT innovations in the public sector (Basyal & Seo, 2017). Without the acceptance of the employees as end-users of the introduced technology, the usage and success of IT-projects cannot be guaranteed in the long run (Krüger, 2014).

One effective measure to ensure acceptance of change in the public sector is to involve employees in the change process (O'Brien, 2002). Involving employees into IT-projects should increase acceptance, as they personally contribute to the projects. Employee participation and involvement into the development process of IT-projects has been an established strategy in the software industry for decades. Within the context of user centred design, projects are tailored to the requirements of the users, which can result in higher usability of software products and an increased acceptance and employee motivation. These approaches are able to improve acceptance of planned changes as early as possible and resolve doubts and fears. Although several participation opportunities and methods exist to involve employees in IT projects in the public sector (Ben Rehouma, 2019) such approach is not yet fully applied in the practice (Ben Rehouma, 2018). Furthermore, the establishment of change management approaches based on participation in the public sector can prove a challenging task (Van der Voet et al., 2016).

## 9.2. Problem Statement and Research Questions

In the public sector employee participation plays a curricular role to ensure their acceptance of change and their effective contribution to their organization (O'Brien, 2002). Several studies recognize the effect of employees' participation in the change process on their acceptance of this change (e.g. (Fernandez & Rainey, 2006; O'Brien, 2002; Reid, Riemenschneider, Allen, & Armstrong, 2008)). Nevertheless, there is so far no empirical evidence on the relationship between employees' participation in IT projects and their acceptance of IT. Researchers are challenging the overall surrounding positive effect of participation (e.g. (Holgersson, Melin, Lindgren, & Axelsson, 2018)) and recommend to investigate the causality between user participation in IT projects and their acceptance of IT in the public sector (Axelsson, Melin, & Lindgren, 2013; Ben Rehouma, 2020; Holgersson et al., 2018). In addition, certain mechanisms are required to ensure the integration of participation in the change management process in the public sector. Holgersson et al., (2018) find that user participation in IT Projects in the public sector is treated in an ad-hoc manner, without any context specific considerations, and without any directions or goals. It remains unclear at the one hand which effects participation has on the acceptance of IT in the public sector, and on the other hand, how participation can be integrated in IT projects in this sector. To the best of our knowledge, no research has been conducted to investigate the empirical evidence on the relationship between government employees' participation and their acceptance of IT. In addition, as mentioned previously, there a clear gap for investigating the integration of participation within IT projects in this sector. To fill this gap, we address the following research questions:

RQ1: Which influence does participation have on government employees' acceptance of IT?

RQ2: What are fundamental aspects to integrate participation in IT projects within the public sector?

In this work, we aim to advance the research filed by providing an empirical evidence on the relationship between employees' participation in IT projects and their acceptance of IT in the public sector. In addition, to identify fundamental aspects to integrate participation in IT projects within this sector.

To achieve this purpose, this study conducted a mixed research in cooperation with employees from public administrations and ministries in north Rhine-Westphalia as well as with employees from public administrations in Bremen. The results indicate that participation has a significant positive influence on government employees' acceptance of IT. However, as previously

mentioned in the literature, it is important to avoid ad-hoc participation and to manage participation carefully to achieve the expected benefits. Our results provide fundamental aspects, which we recommend to consider for integrating participation in IT projects to increase the acceptance of IT in the public sector.

Section 2 presents the state of the art including definitions of participation, an overview on change management approaches based on participation, previous research on participation in Information Technology (IT) projects in the public sector, and the established research model, that will be tested in the quantitative study. The methodology approach is described in detail in section 3. Section 4 provides the results first of the quantitative than of the qualitative study, which are then discussed in section 5. Finally, section 6 concludes our study, outlines implications for research and practice, and acknowledges limitations and future research needs.

### 9.3. State of the Art

#### 9.3.1. Defining Participation

Rank Participation can be defined as “the totality of forms, i.e., direct (personal) or indirect (through representatives or institutions) and of intensities; i.e., ranging from minimal to comprehensive, by which individuals, groups, collectives secure their interests or contribute to the choice process through self-determined choices among possible actions during the decision process” (Heller, Pusic, Strauss, & Wilpert, 1998, p.42). In literature, the term participation is often used as synonym for the term involvement. Whereas involvement is defined as “a subjective psychological state of the individual reflecting the importance and personal relevance that Information System (IS) users attach to a given system”, participation refers to “the various design-related behaviours and activities that the target users or their representatives perform during the system development process” (Barki, Ecole, & Hartwick, 1991, p.487). Ives & Olson (1984, p.26) defined user involvement as “participation in the development process by members of the target user groups.” The authors provide two dimensions of user involvement. The first dimension include mechanisms of user involvement such as steering committees, and representation on project teams, which can be examined as they relate to user attitudes and system use. The second dimension is process related and relies on the question at which stage in the development lifecycle is user involvement appropriate.

Markus & Mao (2004) updated IS participation theory and highlight the importance of managerial participants and of the consideration of those who do not participate such as managers. The authors point out that IT projects affect many more stakeholders than those who

have participated in the development process such as intended users, who may not all have had the opportunity to participate in this process. Whereas “stakeholders are those who are likely to be affected by a solution, whose acceptance and use of that solution could be problematic, and who are therefore logical candidates for participating in solution development or implementation”, participants are the subsets of stakeholders who are actually given the chance to participate in solution development and/or implementation activities.” (Markus & Mao, 2004, 527). In this context, it is important to investigate the implications of who the participants are relative to the population of the affected stakeholders.

### 9.3.2. Change Management Approaches Based on Participation

Rank and Scheinflug (2010) define change management as " [...] the planning, implementation, control and stabilization of changes in strategies, processes, organization and culture with the goal of maximizing the effectiveness and efficiency of the change process and achieving the greatest possible acceptance of the affected managers and employees" (Rank and Bidjanbeg 2010, p18). Further definitions specify change management as a goal-oriented, strategic "shift regarding the [...] strategy, its processes, structures and culture. The aim is to make the change as efficient as possible and to integrate the people concerned into the process" (Spichalsky 2016, p11). Within the scope of this article and on the basis of the previously mentioned definitions, change management is defined as an ongoing process of involving employees and executives of a company or public administrations in ongoing and future change initiatives and projects with the aim of achieving continuous acceptance of the outcomes of said initiatives and projects.

Various change management models have been developed in order to apply change management methods within companies and public administrations. These models divide the change management process into phases in order to facilitate applicability. In 1947 psychologist and social scientist Kurt Lewin published his three-phase model and thus was the first to define change management. Within the models first phase, called "Unfreeze", the hardened corporate and behavioural structures are "defrosted" and prepared for a future change. In this phase employees are informed of planned changes in current processes, organisational structures and IT-tools. Within the second phase the company transitions from its current performance level to a desired altered state. This can cause doubts, fears and resistances among the affected employees, which Lewin declares as core reason why the implementation of acceptance-improving measures have to be promoted in this phase. In the final phase, the increased level of performance is solidified. By means of process controlling methods, the target achievement of the change-project has to be evaluated. Lewin answered basic questions of change

management and laid the groundwork for future models, such as the eight-phase model by John P. Kotter (Kotter, 1995) or the five-phase model by Wilfried Krüger (Helsper & Krüger, 2002). The implementation of change management faces the challenges of the environmental complexity, which public administrations possess. The often times conflicting factors create difficulties for change projects (Van der Voet et al., 2016). Robertson and Seneviratne (1995) argue, that this complexity has negative effects on change management, which requires a common purpose and unity of employees in order to be utilized effectively.

### 9.3.3. Participation in IT projects in the Public Sector

The described models and approaches based upon participation can be beneficial to public sector organizations working to achieve enduring organizational change (O'Brien, 2002). Within change management employee participation represents one core aspect (Stolzenberg & Heberle, 2009). Employees should actively participate in IT projects, in order to achieve long-term success (Van Der Voet, 2013). Stolzenberg and Heberle (2009) highlight the development and implementation of a vision and the communication, participation and qualification of those affected by changes as core aspects of change management (Stolzenberg & Heberle, 2009). In the public sector participation in terms of information and communication, training and support, active participation in project groups, formal participation of the staff council as well as the role of managers have been reported as important potential predictor of government employees' acceptance of IT, which should be deeper investigated in future research (Ben Rehouma, 2020). In this context, information and communication measures imply in addition to the arrangement of information events or the sending of newsletters, especially the active communication between line managers and their employees. Participation in training activities should not only be restricted to take part in standard training courses, but the government agencies should offer employees the opportunity to take part in advanced and customized training courses. In addition, employees can actively participate in project groups, transmit employees 'individual needs, test the new system, and provide feedback about the introduced system. According to (Aladwani, 2001) one effective participation strategy in change management is to inform potential users about the introduction initiatives of IT and communicate with them about the benefits of the system. In addition, training is a further important strategy that helps to get reluctant employees to welcome a new system. Teaching each of the various user groups, hands-on training, providing support staff and actively participating in the implementation process are critical drivers of IT acceptance and implementation success in this strategy. Regarding the involvement of employees within the development process of projects, a variety of methods

can be applied (Herold, Fedor, Caldwell, & Liu, 2008). These methods are classified into three categories. The first category is active participation, i.e. the involvement of employees in project groups, workshops and the feedback collection, for instance via surveys. Another category defines participation as a supportive activity, for example, supplying staff with a dedicated personal contact that helps to identify and solve problems. Lastly, the role of leading personnel is seen as its own category. Managerial leaders have an exemplary function and should act as role models and advocate for change by applying management measures such as motivating employees for the changes and supporting them accordingly.

#### 9.4. Research Model and Hypothesis

To better understand the influence of participation on employees' acceptance of IT, we developed a research model as depicted in Figure 1. This model is based on the assumption that when using IT is mandatory, acceptance of IT become symbolic and refers to the mental acceptance of an innovation (Khosrow-Pour, 2002). In this case, many studies (e.g. (Brown, Massey, Montoya-weiss, & Burkman, 2002; Khosrow-Pour, 2002) recommend to investigate users' attitudes towards IT instead of behavioural intention to use IT as dependent variable for explaining IT acceptance. We follow this recommendation and use attitudes toward using IT as dependent variable in our model, since the use of IT in the public sector is mandatory.

Based on the above-mentioned state of the art, this study investigates the influence of government employees' participation in IT projects on their acceptance of IT as well as the role of manager in this context. This model includes the variables explored in (Ben Rehouma, 2020) and operationalize participation in the identified activities in terms of information, communication, training, support, active participation, as well as formal participation of staff council. The role of managers is investigated in terms of his or her exemplary function and applying of management measures such as motivation and support.

Numerous research studies reported on the positive effect that information has on employees' acceptance of change and attitudes toward IT. For instance, Fernandez & Rainey (2006) explain how information dissemination about the new programs leads to convince employees about this change and to a successful implementation of this programs. Bhattacharjee (2006) identified a positive effect of informational messages with source credibility on potential users' attitude toward IT. Hence, we hypothesize:

H1: Information is positively related to attitude towards using IT

An individual's general willingness to adopt technology is positively related with the communication flow in public organizations (Melitski, Gavin, & Gavin, 2010). Räckers et al. (2013) found that communication has a significant influence on behavioural intention to use IT. Communication is considered as an effective strategy to change the negative attitudes of potential users of an IT system (Aladwani, 2001). Therefore, we state that:

H2: Communication is positively related to attitude towards using IT

Employees' training has been found as one of the most influential factors, explaining the intention to use e-procurement systems in the public sector (Singh & Punia, 2011). Training can be used to shape beliefs about IT, which provide the basis for attitude formation toward this technology (Amoako-Gyampah & Salam, 2004). In addition to the improvement of users' behaviour and performance, the improvement of users' attitudes towards using the system is an instrumental positive outcome of users training (Galletta, Ahuja, Hartman, Teo, & Peace, 1995). Hung, Tang, Chang, & Ke (2009) have empirically demonstrated that government employees' training significantly influences their attitudes towards using IT. Therefore we hypothesize that:

H3: Training is positively related to attitude towards using IT

In addition to communication and training belongs support to facilitating conditions affecting the use of a system and has been identified as one of the important factors influencing users acceptance of IT (Seymour, Makanya, & Berrangé, 2007). Ngai, Poon, & Chan (2007) showed that technical support has a positive effect on attitudes towards using IT. We follow these findings and hypothesize:

H4: Support is positively related to attitude towards using IT

Active participation refers to the active contribution in the change process (Dachler & Wilpert, 1978). Employees in the public sector can actively participate in the introduction process of IT in the public sector e.g. in projects groups, in activities for testing prototypes and assessing the functionality as well as the usability of the system (Ben Rehouma, 2019). This kind of participation encourages employees to give feedback about the change during the implementation process (Fernandez, Rainey, & Rainey, 2017) and helps to reduce their resistance to change (Abramson and Lawrence 2001). We therefore hypothesize:

H5: Active participation is positively related to attitude towards using IT

One of the most important indirect participation forms is the participation of staff representatives such as trade unions and staff council (Horton, 2003). Since the participation of

all employees in the introduction process of IT is not possible, several studies (e.g. (Ben Rehouma, 2018, 2020) agree on the importance of the formal participation of staff councils to ensure the transmission of staff interests and influence the decision making process. Accordingly, we hypothesize:

H6: Formal participation will positively influence attitude towards using IT

The role of managers in change management for the acceptance of IT in the public sector has been discussed in several studies (e.g. (Amoako-Gyampah & Salam, 2004; Brown et al., 2002; Damanpour & Schneider, 2006; Frank & Lewis, 2004; Ragu-Nathan, Apigian, Ragu-Nathan, & Tu, 2004). In this context, managers are supposed to be role models, should act with an exemplary function in using IT themselves, and should apply management measures such as communication and support to ensure the use of IT by their employees. Accordingly, the following hypotheses were proposed:

H7: The exemplary function of a manager is positively related to attitude towards using IT

H8: Management measures are positively related to attitude towards using IT

In a voluntary use context, there is a consensus in the literature on the positive relationship between attitudes towards using IT and behavioural intention to use IT, which is not the case in studies, where the use of IT is obligatory. Therefore, we like to investigate this relationship in the mandatory context and follow further studies (e.g. (Räckers et al., 2013; Shen & Chuang, 2010)), where attitude toward using IT is described as a predictor of behavioural intention to use and propose:

H9: Attitude towards using IT is positively related to behavioural intention to use IT

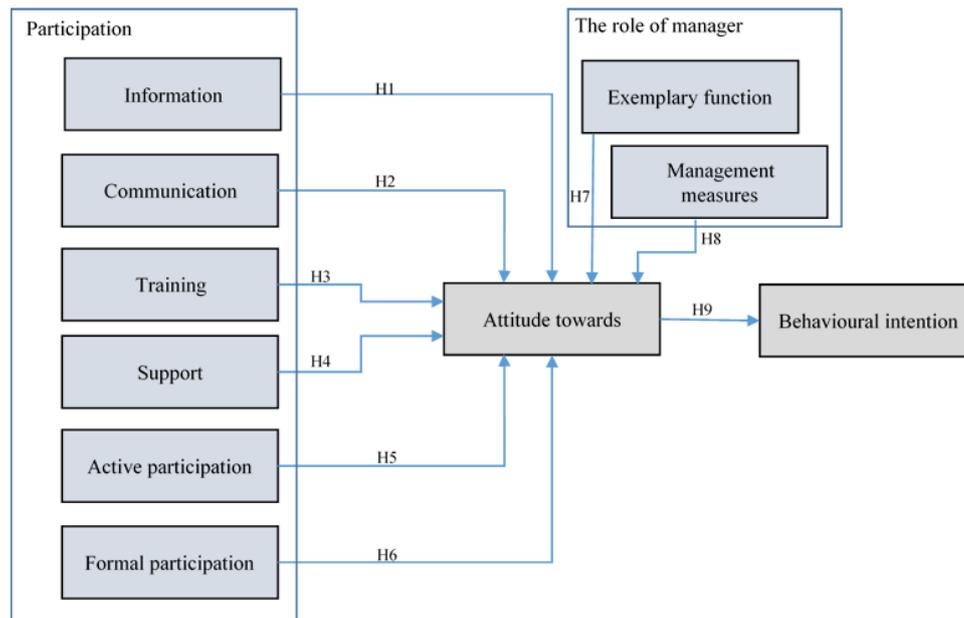


Figure 14 Research model

## 9.5. Methods

Our research uses a mixed methods approach combining quantitative and qualitative data following the triangulation mixed methods design according to (Creswell & Plano Clark, 2007). The combination of both methods has a substantial value in IS research (Kaplan & Duchon, 1988). The triangulation design is suitable to gather complementary yet distinctly data from different sources and to integrate them for analysis and interpretation (Almalki, 2016). The quantitative approach aims to test our hypothesis and primarily to answer the first research question and the qualitative approach primary focuses on the second research question.

### 9.5.1. Quantitative Approach

#### *Data collection and analysis*

For this part of our research, we collected data from February 5<sup>th</sup> to March 15<sup>th</sup> in 2019 using a standardized online questionnaire, which was sent randomly using a simple random sampling technique to employees of a local government administration in Germany. The simple random sampling method gives every possible sample the same probability to be chosen among the population (Meng, 2003). Our questionnaire was structured based on our presented hypothesis and the items developed based on state of the art on participation in IT projects in the public

sector (see Table 21). In addition to the assessment of our presented variables, participants were also asked to assess the existing opportunities for participation in their administration, if participation is important for them, and whether they would like to participate in IT projects in the future. All independent variables, were measured with items using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Attitude towards is measured by the participant's evaluation of the own attitude towards using IT (0 =negative; 1= neutral; 2 = positive). Behavioural intention was measured by the participant's degree of readiness to use new IT applications (0 = not ready; 1 = partly ready; 2 = fully ready).

Table 21 Items used in the questionnaire of this study

Variable	Survey Item
Information (Inf)	
Inf1	I was informed about the introduction of new IT
Inf2	I received newsletters on the new IT
Inf3	I received instructions regarding the new IT
Communication (Comm)	
Comm1	The introduction of IT is communicated in my office
Comm2	There is a contact person for communication in my office
Training (Train)	
Train1	I received standard training
Train2	I received advanced training
Train3	I received customized training
Support (Supp)	
Supp1	I received support for solving my problem with IT
Supp2	I received support in my own desk
Active (ActivePart)	Participation
ActivePart1	I participated in project groups
ActivePart2	I participated in survey procedures
ActivePart3	I participated in design activities
ActivePart4	I participated in testing prototypes
ActivePart5	I participated in evaluating the system
ActivePart6	I participates in feedback activities
Formal Participation	
FormalPart1	I received information about the system from the staff council
FormalPart2	I gave feedback about the system to the staff council
Management Measures	
ManagMeas1	My supervisor motivate me for using IT
ManagMeas2	My supervisor support me in using IT
Exemplary function	My supervisor is for me a role model in dealing with IT
Attitude towards	My attitude towards using IT
Behavioural intentions	For using IT at the workplace, I am

Our questionnaire was pre-tested by one professor with a background in IS, two experienced researchers, and by the staff council of a government administration, which led to few adjustments in our questionnaire according to the received suggestions. In total 104 government employees started the online survey, 99 participated and 78 completed the questionnaire.

For the data analysis, we employed the Statistical Package of Social Science (SPSS) Version 26 to test our hypothesis. We performed a correlation analysis based on Pearson as well as a regression analysis to identify the coefficient of determination  $R^2$ . The Pearson correlation coefficient measures the strength of the correlation between two variables and the coefficient of determination  $R^2$  measures the proportion of variation in the dependent variable explained by the independent variables (Hinton et al., 2014). In addition, we performed a univariate ANOVA to test the differences between groups with positive, neutral and negative attitude towards using IT. Excel Spreadsheets were used for the descriptive statistics.

#### 9.5.2. Qualitative Approach

For this part of our research we collected data from federal government administrations in north Rhine-Westphalia using expert interviews from October 11<sup>th</sup> to November 18<sup>th</sup> in 2018. Our interview guideline was structured based on our presented research questions and objectives (see Table 22). Our choice of the participant interviewees is based on the recommendation of (Harald A. & Näf, 2005) who defines an expert as an individual who possesses specific knowledge and skills based on years of experience. The experts we recruited for our research fulfilled this criterion. The intended user group of the interviews were individuals in decision making positions, e.g. IT project managers, IT managers, project management staff, department heads, etc.

The interviews were scheduled to have a duration of 45-60 minutes. Within this time, the participant's experiences regarding employee participation, project processes and their views regarding the integration of employees into IT projects were assessed. In addition, the preferences of the experts with regard to the selection of participation methods in change management were investigated. The interview guideline is divided into two sections that specifically cover each of the research questions.

The first section of the interview followed the goal to determine the experts' experiences with participation in past IT projects and the effect of the applied participation methods on the acceptance of the employees. The initial section of the interview inquires the experts' fundamental attitude towards employee participation in general and their knowledge

concerning suitable participation methods. The interview partners were then asked to share their experiences with employee participation in IT projects and which participation methods they believe to be most suitable.

Table 22 Examples of the questions used in the interviews

Goal	Example of questions
Gain insight into previous uses of employee participation methods.	Which forms of employee participation have you made use of in the past? Did you conduct a preselection? How was this selection performed?
Determine preferred methods on the basis of past experience	Given free reign, which methods of employee participation would you have chosen?
Inquiring the current status quo and procedures.	Which methods are used in regards to employee participation currently? How can these acceptance-improving methods best be integrated into IT projects in the public sector?

The second section of the interview guideline focused on fundamental aspects for applying these participation methods and procedures in the public sector. It was discussed how these participation methods can be implemented into change management process in the public sector. The aim of these questions were to determine the experts' preferred strategies to integrate participation within change management in the public sector.

In the next chapter, the results of the quantitative and qualitative analysis are presented in detail.

## 9.6. Results

### 9.6.1. Quantitative Analysis of Participation in IT-Projects in the public sector

#### *Validity and Reliability Analysis*

We present in *Table 23* the validity and reliability of our measurement using Cronbach's Alpha ( $\alpha$ ) for the internal consistency of our constructs and VARIMAX rotation matrix for factor analysis to assess the convergent validity. In general, a reliability value of 0.90 and above is considered as excellent, between 0.70 and 0.90 as high, between 0.50 and 0.70 as moderate, and of 0.50 and below as low (Hinton et al., 2014). Except the moderate reliability of communication, all other variables demonstrate a high or excellent reliability. The exemplary function of manager, attitudes towards using IT and behavioural intentions were measured respectively using a single item. The rotated factor loadings was performed with an eigenvalue

larger than 1 and removed the correlations that are of 0.3 or less. The matrix extracted 7 factors and showed how the items load on each factor. Two items were excluded from the survey due to the low value of factor loading.

Table 23 Results of the Validity and Reliability Analysis

Variable	Number of items	Items	Factor analysis	Cronbach's Alpha ( $\alpha$ )	Sample (n)
Information	3	Inf1	0.732	0.74	78
		Inf2	0.624		78
		Inf3	0.747		78
Communication	2	Com1	0.690	0.55	78
		Com2	0.665		78
Training	3	Train1	0.755	0.76	78
		Train2	0.767		78
		Train3	0.650		78
Support	2	Supp1	0.707	0.90	78
		Supp2	0.521		78
Active participation	6	ActivPart1	0.799	0.87	78
		ActivPart2	0.832		78
		ActivPart3	0.807		78
		ActivPart4	0.844		78
		ActivPart5	0.809		78
		ActivPart6	0.786		78
Formal participation of the staff council	2	FomalPart1	0.868	0.69	78
		FomalPart2	0.844		78
Management measures	2	ManagMeas1	0.870	0.86	78
		ManagMeas2	0.877		78
Exemplary function	1			-	78
Attitude towards	1			-	78
Behavioural intentions	1			-	78

### 9.6.2. Identification of the current situation of government employees' participation in IT projects in the public sector

Based on the results of the survey, 83% of respondents feel sufficiently informed about the introduction of IT projects in their agency and according to 78% the introduction of new IT applications is well communicated. In terms of training, 85% of the respondents state that they have participated in standard training courses, and 61% have participated in customized training courses. Furthermore, 73% state that they have received support at their workplace. Concerning active participation in IT-Projects, only 25% of the respondents were involved in such projects.

While 64% were not involved in activities for surveying the existing work processes, only 25% of respondents confirmed that they have been involved in testing new IT applications, and 66% of respondents were involved in further feedback activities about these IT applications.

An important aspect that was also examined in the survey is the assessment of participation. As we can conclude from Figure 15, about 44% of the respondents consider the existing participation opportunities to be inappropriate. Nevertheless, 88% of the respondents consider that the participation of employees in IT projects is important and 65% would like to participate in IT projects in the future.

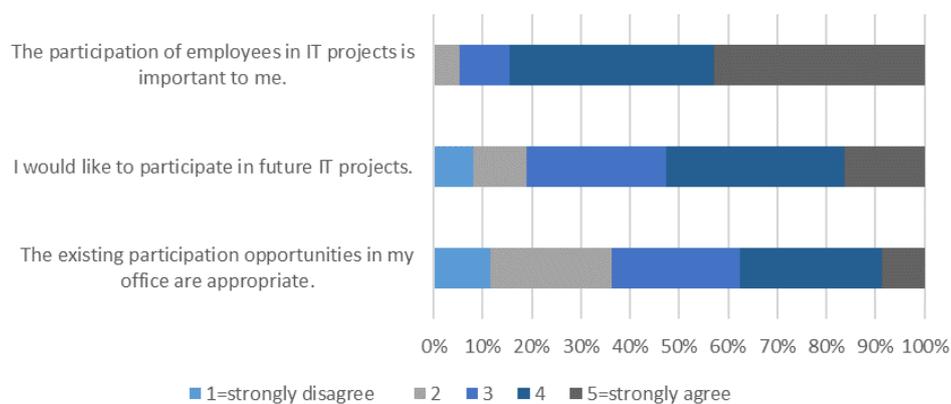


Figure 15 Assessment of participation

A further important aspect that we have addressed in our questionnaire is the manager role. About 69% of respondents feel motivated by their managers to use new IT applications, and 60% said that they receive support from their managers when using new IT applications. The exemplary function of managers was confirmed from about 48% of respondents.

### 9.6.3. Hypothesis Tests

The univariate ANOVA shows a significant difference between groups with positive, neutral and negative attitude towards using IT for information with  $p=0.015$ , communication with  $p=0.0004$ , support with  $p=0.01$ , active participation with  $p=0.006$ , and for the role of managers with a significant difference with  $p=0.03$  for the exemplary function and  $p=0.02$  for management measures. The main differences are for all variables between groups with negative and groups with positive attitudes towards using IT.

The correlation analysis indicates an overall highly significant relationship and moderate positive correlation between the variables in H1 to H9 expect H6 (see Table 24). Looking at participation constructs, support seems to have the strongest correlation with the attitudes

towards using IT followed sequentially by communication, active participation, information, and training. The role of the managers indicates likewise a significant correlation with attitude towards using IT. In contrast to the participation of the staff council, which not indicates any significance for employees' attitude towards using IT.

Based on the coefficient of determination  $R^2$  we can explain, except of H6 about 7.1% to 17.5% of the variance in our dependent variable attitude towards using IT. The  $R^2$  value of 0.415 indicates that 41% of the dependent variable behavioural intentions can be explained by attitude towards using IT. The findings indicate that all hypothesis (H1 to H9) except of H6 are significantly supported.

Table 24 Results of the Pearson's correlation and the linear regression analysis of the constructs in H1 to H9

Hypothesis	H1	H2	H3	H4	H5	H6	H7	H8	H9
Pearson	0.329**	0.399**	0.266*	0.401**	0.354**	0.068	0.306**	0.290*	0.644**
$R^2$	0.108	0.159	0.071	0.175	0.126	0.005	0.094	0.084	0.415

\*\*p<0.01 \*p<0.05

In summary, we can conclude that employees' participation in IT-projects in the public sector has a significant correlation with their attitude towards using IT and helps in moderate manner explaining their adoption of IT.

### 9.7. Qualitative Analysis of Participation in IT-Projects in the public sector

The expert interviews conducted in different ministries resulted in several key findings, which we present in this chapter. Concerning upcoming changes in organisational structures, processes and IT, particularly employee participation has the potential to increase the acceptance of IT-solutions during their development but also after their completion. The fact that several IT-projects have failed in the past, due to missing employee involvement, makes the consideration of employees' participation even more important. The reasons for this were firstly an irregular distribution of information and secondly a lack of attention for suggestions and critique made by affected personnel. This resulted in IT-solutions, which often do not fit specified user requirements. Additionally employees have built up resistances during the IT-development in the past, which resulted in their refusal to work with project results. They would refuse to acknowledge the positive changes the project had on work procedures and would continue to rely on old methods and systems. Several experts described this situation. In order

to avoid such a situation in the future, it was stated that, employee participation should be considered in order to enable a project to have long-term positive effects.

#### 9.7.1. Definition of a participation framework and suitable methods in the project initiating phase

One aspect that was mentioned in the expert interviews is the accurate and detailed planning of project scope, size and a communication strategy in the project initiating phase. An expert recommended that an established framework for employee participation like the 8-phase Model (Kotter 1996) should be applied in this early planning phase. Already in this early project phase it should be determined as to what extent the suggestions and criticism of employees should be taken into account. An aspect to consider in this regard is that too much employee participation may also lead to undesired consequences, such as too many extra wishes made by the employees. If these wishes are not considered, because they might be outside of the scope of the project, employees may in turn become frustrated. In addition to this, considering all recommendations may lead to significant additional efforts and costs. A balance needs to be found in that issue. In order to prevent these issues from surfacing, the degree of participation needs to be defined. This should be done based on the projects' scope, goals and involved groups. The degree of participation must be communicated to the involved employees as soon as possible. This can reduce potential frustration regarding employees' neglected feedback and requests. Furthermore it became obvious that the project management is confronted with the pressure to implement employee feedback if this communication doesn't happen. In detail, experts recalled, that participation methods such as interviews and surveys create a pressure to realize the employee's wishes and remarks. If this is not addressed, it could lead to the formation of resistance among employees and create frustration. This pressure must be considered during project planning to avoid employee complaints in later phases of the project.

#### 9.7.2. Choosing the most suitable participation methods

The second aspect focuses on the selection criteria for choosing the most suitable employee participation methods. According to the experts, no universally valid approach for employee participation exists as the scope and degree of standardization for each project is unique. In addition, they stated, the question is not if employee participation needs to be utilized but how it should be implemented. In relation to the non-existing universal approach it was determined that change management methods must be chosen in accordance to the projects' scope, the framework conditions and the targeted user group. The level of hierarchy, which participation

will be used in, has to be specified. This is because different approaches have to be considered, according to the hierarchy level and the technical knowledge of the affected employees. The involvement of a group of IT-department managers would require other participation methods than regular members of staff from a lower hierarchical level. Concerning the scope and degree of standardization of a project, the experts recommend to directly recruit a small group of end users with specialist knowledge, in case of IT-project with the scope of creating a highly specific user system with low standardization. In this case, the technical expertise of the employees should be considered in the requirements specification phase. This can be done by using methods like focus groups or workshops. The involvement of these specialists can be reduced in later project phases, as their feedback was directly integrated into the early development process. IT projects with a low degree of standardization and a large user base require an opposite approach. The experts suggested that the affected parties should only be involved after the system requirements have already been fundamentally defined. This can be done with the use of large-scale feedback collection methods such as surveys or online questionnaires. The aim of this participation approach is to use the suggestions and possible criticism from a large group of users to improve upon a created prototype. Moreover, this approach can reduce the coordination effort in the initial planning phase of the project. As part of this approach, employees will be involved into the planning of participation. As an example, prior to the official roll-out of a new IT-tool, employees give recommendations to determine suitable organizational units, in which the roll-out could begin. Newly developed IT-systems may require training, to ensure an optimal level of performance. In this case, project staff could interview employees to determine the content and scope of the training sessions.

### 9.7.3. Utilization of established methods

In the previous paragraphs the definition of a participation framework and the selection criteria for methods were presented. This paragraph focuses on the methods that have been used in past projects and have been regarded as successful.

In the context of feedback collection during projects, surveys and questionnaires can deliver insights concerning the widespread acceptance of a project. Surveys are best utilized in advanced phases of projects and should involve all affected employees. For in-depth feedback about projects during the project execution, the personal interview is the method of choice. Within these interviews, the employees' personal opinion, fears and problems regarding the project can be assessed. The experts recommend limiting the amount of employee interviews, so that the planning of these employee interviews remains manageable. However it was also

noted, that in order to adhere to privacy regulations, a minimum of seven participants for surveys and interviews are necessary. Otherwise, the anonymity of the information cannot be guaranteed, as noted by the experts.

In addition to feedback collection, interviews can be used in other phases of the project to gather information. They represent an effective tool in employee participation, as they can also be used to involve employees into the planning and execution phase of projects, e.g. in a requirement analysis for an IT-project.

In regard to active participation of employees, workshops have proven to be effective in involving employees into the development of IT-Systems. Groups of employees can comment, discuss and give feedback on the current project status. Moreover, project artefacts such as prototypes can be shown and tested by these work groups. Although they require extensive preparation as well as time for precise evaluation, the experts stated, that workshops have shown very positive results in regards to improving acceptance.

In order to facilitate the learning results of a workshop, an expert recommended the method of the “Corridor Runner”. In this method, an employee with in-depth knowledge about the workshop topic assists the workshop attendees in order to refresh the information they have learned. They act as a personal contact and private trainer. This method has shown very positive results in the past. Likewise, a school-based system of training was considered as a promising approach for continuous learning. After the completion of a workshop, the trained employees continue to practice using the new IT-tool and report their progress to a member of the projects’ development team. They are then given feedback on their learning results, which in turn allows them to improve.

A promising method in preventing change related fears gives employees the opportunity to experience future IT-solutions first hand. With this method, IT-solutions are prototyped and made presentable. These solutions are then available to employees, who can test the prototypes within short testing sessions during the workday. This allows employees to familiarize themselves with upcoming changes. In addition, they are able to give feedback on the prototype, which can be considered during further development.

#### 9.7.4. Establishment of an information dissemination plan

The fourth aspect focuses on the dissemination of information during IT-projects. In order to provide adequate information regarding project status and results regularly a target group specific information distribution plan should be created and implemented. This policy regulates

the information flow within the project team as well as the communication with involved employees outside of the project team. An expert described, that the neglect of using an information distribution plan can cause confusion within the project team. This confusion can stem from redundant information being sent or unaffected employees being messaged. As previously stated, the information distribution plan can prevent this erroneous distribution; however, it can have additional beneficial effects. One such effect is that it creates transparency over the projects current status. Through this transparency, the projects' susceptibility to errors can be reduced, because internal project information is readily available for all project members and involved employees. This enables them to detect potential issues, mistakes or oversights in the project.

Within an information dissemination plan, a multitude of factors need to be considered. Firstly, the project management needs to define which stakeholder group is affected by the project in which extent. Based on that a group specific policy (e.g. what information is distributed in which intervals) has to be established This policy includes factors such as urgency, the communication systems used to send and receive information but also which communication channels need to be applied. Upward channels are intended to provide weekly status reports, email updates and in-person reviews with stakeholders in superior positions. Alternatively, a downward channel is intended to communicate with the project team on project tasks, as well as sharing project-internal information. Lastly, lateral communication channels are intended to communicate with employees for example through email updates (Fred C. Lunenburg 2010). After selecting the communication channels for each stakeholder group, the form of communication needs to be determined, such as face-to-face communications in meetings, hard-copy communications, through letters or reports, or through electronic means, such as emails, videoconferences, etc.

## 9.8. Discussion

Our findings from both approaches reveal that **employees' participation is as a critical factor for the acceptance and success of IT projects in the public sector**. To answer our first research question RQ1 "Which influence does participation have on government employees' acceptance of IT?" the quantitative approach investigated the empirical evidence on the relationship between participation and IT acceptance. The results showed that even if many participation methods, especially those related to active participation for feedback collection are not sufficiently used in practice, the majority of the surveyed employees believe

participation to be important and they would like to participate in IT projects in the future. In addition, the quantitative approach has confirmed that employees' participation in the form of **information, communication, training, support** and **active participation** in IT projects as well as the **manager role** in terms of his or her exemplary function and applying of management measures to motivate and support employees using IT in the public sector, all have a significant positive linear relationship with employees' attitudes towards IT. These findings are in line with different previous studies, which support this positive effect on users' acceptance of IT (e.g. (Aladwani, 2001; Fariborz Damanpour & Schneider, 2008; Hu et al., 2003; Hung et al., 2009; Muneera & Didar, 2015). Our results enhance these studies by providing the empirical evidence on participation and acceptance in terms of different participation activities applied along the whole introduction process of IT before and after the introduction of an IT system. Our results show the importance of several participation measures, which affect all the intended users of the introduced system as well as further stakeholder such as managers, who may perhaps not use the system. As previously mentioned in the state of the art, it is important by participation to consider not only the hand-on users, but all the employees who are affected with the introduction of this system. In addition, our qualitative approach also clearly supported this relationship and reported on the effect of employee participation in increasing the acceptance of IT-solutions during their development as well as after their completion. However, our findings showed no significance relationship between the formal participation of staff council and employees acceptance of IT in contrary to previous studies, which support this relationship (e.g. (Ben Rehouma, 2020)).

Furthermore, our qualitative analysis identified key aspects for the integration of participation in IT within the public sector. For answering our second research question RQ2 "What are fundamental aspects to integrate participation in IT projects within the public sector?" the results of this approach reveal that **employees' participation in IT-projects in the public sector should be precisely defined in an early project planning phase**. A framework should serve to manage participation in all subsequent project phases. Ben Rehouma (2019) argued that employees' participation in IT projects in the public sector should be managed carefully, in order to achieve the expected benefits. One major part of a framework should consider the extent and degree of participation. Public administrations should avoid ad-hoc participation without clear direction and goals and provide a concrete advice of user participation (Holgersson et al., 2018). A further aspect is the consideration of the pressure project management could have in responding to and in implementing the collected feedback from the employees. Managing effective participation in IT projects is a big challenge, which requires

providing time off in lieu from daily work as well as relaxing deadlines (Kensing & Blomberg, 1998).

Furthermore, we argue that **criteria of employee participation methods** should be selected in accordance to the projects' scope, the framework conditions and the targeted user group. Whereas standard IT projects for a large target user groups claim more participation in later project phases, customized or smaller IT-projects for a specific target group require more participation from a specified group in earlier project phases. In addition, the level of hierarchy, in which participation will be used, has to be specified. That means that **the choice of the appropriate participation method** depends not only on the above mentioned criteria such as the project scope and the target group but also on the hierarchy level and the IT-skills or technical knowledge of the employees. Karlsson et al. (2012) indicated that unclear user target segments, the nature of participation, and the lack of adequate skills are big challenges in the context of e-service development that need to be considered when choosing between different participation approaches in public administrations. Moreover, we also suggest **involving employees into the planning of participation** for example in activities for testing the system before the rollout or for the development of training concepts. Ben Rehouma (2019) evaluated several employees' participation methods, that can be used in IT-projects in the public sector and reveals that it is important to involve employees in such activities. Employees can be consulted to determine the content and scope of training and evaluate it for possible improvements. In this context employees as real users, can test the system in a real environment and give feedback about it through for instance surveys or interviews. Such methods are well applied in the public sector to collect feedback during projects. Surveys, questionnaires and interviews can deliver insights concerning the widespread acceptance of a project. The active participation of employees in workshops and in school-based training system are also well established methods used in the past. Regarding the extensive pool on participation methods, the missing of management and of knowledge concerning the methods used for participation in IT projects in the public sector is considered as one of the main reasons for a lack of employees' participation in this sector (Ben Rehouma, 2018). In addition to the previous mentioned aspects, our analysis supports **the utilization of established methods** that have been used in past projects and have been regarded as successful.

As previously mentioned, information and communication are important participation basics that influence government employees' acceptance of IT. This study propose **the establishment of an information dissemination plan**, which provides adequate information about the project status. This policy helps creating transparency, detecting potential mistakes, and regulating the

information flow and communication within different stakeholder. The participation of employees helps reduce resistance to change by promoting the dissemination of critical information and encouraging employee feedback for possible improvement of the change during implementation (Fernandez et al., 2017). Employing different forms of active participation as well as written and oral communication among employees helps convincing them of the need for a change (Fernandez et al., 2017). Not only the form of communication needs to be determined in this aspect, but also the selection of communication channels for each stakeholder group. Sanina et al. (2017) analysed what channels should be used and in what combination and showed the effectiveness of the use of different communication channels such as face-to-face as well as mediated communication to achieve the desired result from government communications.

We believe that change management approaches based on employees' participation have to be adopted in the public sector to achieve a successfully implementation and acceptance of IT-projects. On the base of our findings and their consistent with previous literature, we recommend to consider our key findings when implementing IT projects in the public sector.

#### 9.9. Conclusion, Implications and outlook

The aim of our research was to investigate the empirical evidence on the relationship between government employees' participation in IT projects and their acceptance of IT. In addition, this research study aimed to identify fundamental aspects, which help integrating participation in IT projects in the public sector, in order to increase employees' acceptance of IT and to achieve a successfully introduction of IT projects in this sector. To achieve this purpose, we conducted a quantitative and qualitative research using surveys in a local public administration in Germany, and expert interviews in ministries in north Rhine-Westphalia.

Thus, we highlighted in answering our first research question that employee participation in IT-projects has a significant linear relationship with their attitudes towards using IT. Our results show that participation can have multiple beneficial effects on the acceptance of IT in the public sector. Participation in terms of information, communication, training, support and active participation using different methods has a significant correlation with employees' attitude towards using IT and helps explaining their acceptance of the changed processes and application systems in this sector. Furthermore, the role of managers was also identified as an important factor influencing government employees' acceptance of IT. Through our research, we found that whilst the information dissemination regarding IT-projects and their induced

changes are high amongst employees, the actual participation of employees within IT-projects remains low (around 25 %). In relation to this, 88% of surveyed employees answered that they believe participation to be important for IT-projects and 65% declared, that they would be willing to make use of participation possibilities. In addition, we investigated multiple methods and procedures that have proven successful in the past such as interviews, focus groups, workshops and surveys, which are suitable to actively involve employees during the change process such as for feedback collection during projects or for the development or testing the IT solution.

Additionally, we identified fundamental aspects for integrating participation in the public sector (RQ2). We found four key aspects presenting strategies and methods for the definition of participation frameworks, the selection of suitable methods in the project, the utilization of established methods as well as the establishment of an information dissemination plan. We strongly recommend to consider these aspects to successfully integrate participation in IT projects in the public sector.

Our findings have several implications for theory and practice. Our study enhances previous research on employees' acceptance of IT in the public sector by empirically testing the evidence of the influence of government employees' participation in IT-projects on their acceptance of IT and showing how participation matters in this context. In doing so, this study identified six determinants of government attitudes toward IT, in the following sequence: support, communication, active participation, information, training, and the role of managers. This study showed also that even though the use of IT in the public sector is mandatory, government employees' attitudes towards using IT influence their behavioural intention to use this technology. We suggest researchers to deeper investigate factors influencing government employees' acceptance of IT and look beyond the technical factors and traditional models of IT acceptance. Indeed, researchers investigating employees acceptance within contextual perspective identified several important factors influencing employees acceptance of IT in the public sector such as participation and the role of manager (e.g. (Ben Rehouma, 2020; Fariborz Damanpour & Schneider, 2006b). In addition, government policy makers can use our key findings as strategy to integrate change management based on participation into IT projects within the public sector. Our identified fundamental aspect help managers in the public sector as policy for managing effective participation.

This study has several limitations. We cannot generalize the findings, since the sample of the study is limited and the study was conducted in only two federal states in Germany. Researchers

can investigate employees' participation in IT projects with many more stakeholders (as well as further experts) and in other cities and countries. In addition, researchers can explore more key factors, which could help integrating employee participation within the public sector. Future research may focus on further possibilities of change management within the public sector as well as of the participation of employees in IT projects specifically.

## 10. Employees' Participation in IT Projects in the Public Sector: Mapping Participation to the Project Lifecycle

<b>Title</b>	Employees' Participation in IT Projects in the Public Sector: Mapping Participation to the Project Lifecycle
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<b>Reference in this document</b>	P5
<b>Abstract</b>	Employee participation in IT projects in the public sector is argued in the literature as a critical factor for the success and acceptance of IT. However, studies on employee participation reported on the lack of end-users participation in the public sector and on the need of improvement of participation concepts. This article investigates different participation practices and used methods for participation within different approaches such as Human Centred Design, Ethnography, Contextual Design and Human Resource Management, and explores opportunities for participation across the system development life cycle in the public sector. The findings reveal a variety of participation opportunities across the whole process. Finally, implications of these findings are discussed with suggestions for future research.
<b>Keywords</b>	Contextual Design, Ethnography, Government, Human Centred Design, Human Resource Management, Involvement, Lead Users, Literature Review, Participatory Design, Software Development, User Involvement



## **Employees' Participation in IT Projects in the Public Sector: Mapping Participation to the Project Lifecycle**

### 10.1. Introduction

The benefits of user participation in information technology (IT) projects have been reported in several studies within various research areas. Effective user participation within the System Development Life Cycle (SDLC) has been shown to have a positive effect on the success of the system in terms of user satisfaction, system use, system quality, ease of use, as well as keeping the project in time, within budget (Abelein & Paech, 2015), and within the level of system acceptance (Damodaran, 1996). User satisfaction and attitude toward an information system are positively influenced by their participation and involvement within the development process (Lin & Shao, 2000). Other than typical elicitation techniques, user participation in the SDLC is an effective way to understand users application domain, their daily work practices, the environment of the system use, their requirements and especially their behavior and preferences (Muneera & Didar, 2015). Employees in the public sector seem to have stronger resistance to change, hindering their IT adoption than those in the private sector (Parente & Prescott, 2016). End-user participation in the public sector has been identified as a strategy for overcoming organizational and managerial challenges of IT projects (Ramón Gil-García & Pardo, 2005). Change management approaches based upon participation benefit public-sector organizations working to achieve enduring organizational change (O'Brien, 2002). This perspective stimulates employees to actively contribute to IT projects (Van Der Voet, 2014). Despite the importance of participation, many studies report on lack of end-user participation in IT projects in the public-sector and underline the need for improvement of such concepts (Ben Rehouma, 2018; Følstad et al., 2004; Horton, 2003b; Rao Baliwada & Jayaram, 2014). A primary reason for the lack of participation is the missing of management of and knowledge concerning the opportunities and methods used for participation in IT project (Ben Rehouma, 2018).

Despite the awareness of user participation within the public sector, there remains a need for external experts to explicate the importance of utilizing participation methods suited to the IT development process (Følstad et al., 2005). Employee participation in the public sector remains a topic that hitherto has been less investigated in e-Government and Information Systems (IS) research. Participation researchers have so far prioritized the study of employee participation in IT-projects as motivational practices and have focused on outcomes of participation in the form of benefits of system success. Another research stream has focused upon citizen participation to improve government services (Abu-Shanab, 2015; Fung, 2015; Jho & Song,

2015). To fill this gap, this study aims to advance the research in this field by investigating opportunities for employee participation across the SDLC in the public sector, by addressing the following research question: How could government employees participate in IT projects?

In order to achieve this purpose, this paper uses a hermeneutic framework to identify participation approaches and explores opportunities for employee participation and methods that can be used across the SDLC within the public sector. This paper carries out a qualitative analysis and evaluation of findings with a focus on the content of the reviewed articles; by exploring practices of participation and used methods from the identified approaches and mapping them into the activities of the SDLC.

This paper is organized as follows: Section 2 presents the theoretical framework, including the definition of participation and its specifications in the context of information systems. Section 3 describes the applied research methodology, followed by the results within section 4. The established framework is presented in section 5. Lastly, section 6 summarizes the findings, discusses implications for research, policy and practice.

## 10.2. Theoretical Background

### 10.2.1. Participation

Literature on participation embraces different sciences, with topics treating organizational, social, and political issues (Dachler & Wilpert, 1978). Participation refers to “taking part” and means “to contribute to something” (Barki & Hartwick, 1994).

According to Heller, Pusic, Strauss, and Wilpert (1998), participation in decision making is:

*the totality of forms, i.e., direct (personal) or indirect (through representatives or institutions) and of intensities; i.e., ranging from minimal to comprehensive, by which individuals, groups, collectives secure their interests or contribute to the choice process through self-determined choices among possible actions during the decision process.*  
(p. 42)

Following a multidimensional analysis, along which participatory systems may vary, Dachler and Wilpert (1978) emphasize the different properties of participation explained in this definition and provide four defining dimensions of participation in organizations. While indirect participation implies some form of representation, direct participation is considered the ideal form of participation, referring to immediate personal involvement in decision making. Formal and informal participation refer to the form of legitimization and vary from formal

agreements to informal non-statutory consensus between interacting members. The degree of formality or informality of participation is related to the goal of participation and to the context to which the participatory system exists (Dachler & Wilpert, 1978).

The literature uses different terms to describe employees' or users' participation issues, such as "involvement" and "empowerment." Rao Baliwada and Jayaram (2014) describe involvement as "a subjective psychological state of users which is practiced in forms of participation through behavior and activities" (p. 7). This definition argues that the involvement of employees in an organizational change grants them a sense of responsibility and commitment to the organization. Employee empowerment is considered as a management approach to encourage innovative behavior, mainly through four practices: providing information about goals and performance; offering rewards based on performance; providing access to job-related knowledge and skills; and granting discretion to change work processes through employee participation (Fernandez & Moldogaziev, 2013, p. 159).

Different issues imply different forms of participation. Whereas organizational decisions are often subject to indirect participation through employee representatives, proximal issues like organizing work tasks are more often subject to direct participation (Joensson, 2008). In this context, specifying the form of participation by conducting research regarding participation is recommended. In this paper, participation is understood as different opportunities to involve employees in a direct formal, direct informal, indirect formal, or indirect informal way in IT projects during the SDLC in the public sector.

#### 10.2.2. Participation Theory in the Information System Context (IS)

Traditional IS participation theory had mainly focused on the role of user participation in system development as a factor of IS success, and understands participants in terms of users, specifically as hands-on users (Markus & Mao, 2004). An update of the area of participation in IS theory has elaborated on key elements, including the conceptualization of stakeholders and participants and the characterization of participation activities (Markus & Mao, 2004). In this context, participation activities consist theoretically of three types: solution-design participation activities, solution-implementation, participation activities, and project-management participation activities. These activities are differentiated in terms of richness and relation to their outcomes. The implication of participation activities in planning or decision-making activities, such as designing training programs, are more rich participation activities than it would be in operational activities such as training others or being trained. Such training

activities are related to outcomes such as system acceptance and use, rather than outcomes in terms of system quality. This “new” theory of participation in IS reveals the need to include the concept of “change agents” in this context. Change agency is a role that managers, IS professionals, HR professionals, or external consultants and vendors can assume, and is responsible for the selection of participants from among the affected stakeholders, for the creation of participation opportunities across the project (Markus & Mao, 2004).

### 10.3. Research Methodology Literature Review design

The framework presented in this paper is based on a hermeneutic literature review (Boell & Cecez-Kecmanovic, 2014). The hermeneutic framework follows a different approach than traditional literature reviews. It is an iterative process of understanding the text as a part and the context as the whole; i.e., the understanding of the research phenomenon arises gradually after reading the identified literature, and increases with the search and reading of further publications (Boell & Cecez-Kecmanovic, 2014).

As described in Figure 16, the review process consists of two major hermeneutic circles intertwined, the search-and-acquisition circle and the analysis-and-interpretation circle (Boell & Cecez-Kecmanovic, 2014). The review process begins with initial ideas or questions in the search-and-acquisition circle, which in turn leads to the redefinition of the search. Reading the identified publications contributes to the development and increasing understanding of the phenomena of interest and enables the reader to identify further publications of potential interest. Additionally, further reading enables one to develop links between the search-and-acquisition circle and the analysis-and-interpretation circle. After first developing an understanding of the research phenomena, mapping and classifying help the researcher to provide a systematic analysis and classification of the findings within the body of the relevant literature. On the base of this analysis, the researcher can conduct critical assessment of the body of literature and identify gaps for future research through argumentation.

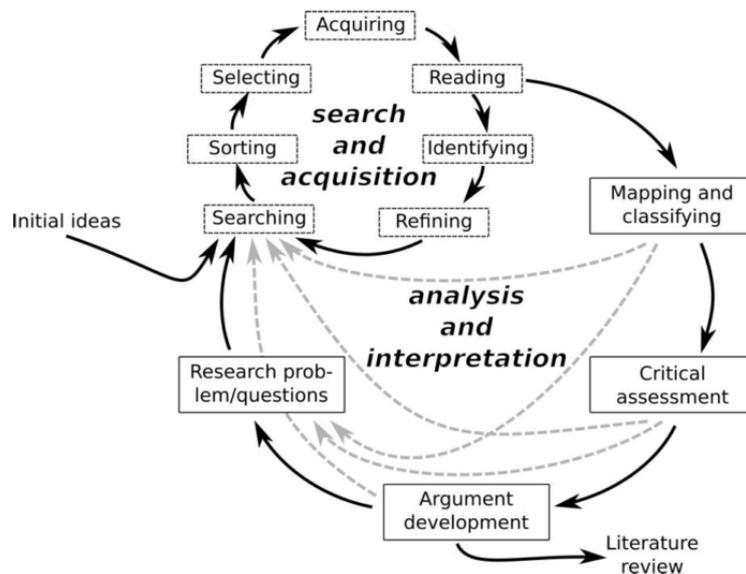


Figure 16 . A hermeneutic framework for the literature review process consisting of two major hermeneutic circles (Boell & Cecez-Kecmanovic, 2014)

### 10.3.1. Identifying the Relevant Literature

In this study, the search of the literature was conducted between March 1 and May 31, 2018 and began with, identifying the gap in the state of research in this area, namely that participation is seldom investigated in this context. At first, the search was conducted primarily in databases, “Scopus” and “Web of Science”. By introducing the key terms “user participation” and “user involvement” in the form of search queries with and/or in combinations with the terms “IT,” “project,” “public sector,” “government,” and “systems”. After reading the identified literature in this iteration, the search for further literature progressed with the aim of understanding which methods involve users in the development of IT in practice. The mentioned search keywords were extended with the keywords “methods,” “development” and “SDLC”.

The identified articles offered a wider range of specific vocabulary for further search in different participation approaches, especially in the Human-Computer Interaction (HCI) field. The previous search keywords were combined with the following approaches identified in the literature: “participatory design,” “user-centered design,” “user innovation,” “lead users,” “ethnography,” “contextual design,” and “human resource management.” Based on this matching of keywords, the search and identification of relevant literature was continuously explored across these topics of interest with the aim of exploring methods used for participation in these approaches. Table 1 provides an overview of the utilized search keywords.

Table 25 Search keywords

	Behavior	Stakeholder	Domain	Approach	Environment
Keywords	Participation, involvement	User, employee, servant	IT, projects, software, system, development lifecycle	Methods, participatory design, user-centered design, user innovation, lead users, ethnography, contextual design, human resource management	Government, public

For the search process combinations of the four categories mentioned in Table 25 were used but also single terms. Exemplary search strings looked like:

{(Participation) OR (Involvement)} AND {(User) OR (Employee) OR (Servant)} AND {(IT) OR (System) OR (Software) AND {(Public Sector) or (Government)}}

*Criteria for inclusion*

Given the review is conceptual in purpose, it does not consider with quantitative results, and thus includes additional articles in the analysis, only if they have enriched the previous existing knowledge and reported on additional user-participation approaches, practices or methods. To ensure the quality of the findings, only peer-reviewed articles were included, and the citation index of each article has been checked.

10.3.2. Data Coding and Analysis

The initial iteration for article selection was made by the author based on title and abstract of each article. The identified articles were coded to content related categories according to (Webster & Watson, 2002). This is a suitable approach for synthesizing and discussing each identified concept in the literature and requires the reading of the full text of each article. The categories are comprised of “Participation Approach,” “Practices of Participation,” and “Typically Used Methods.” The codes were conducted from the author and experienced researcher to ensure the intercode reliability. For the data coding "MAXQDA", which is a tool for qualitative data analysis, was used, The analysis and interpretation of findings are based on mapping and classification of the identified practices of participation and the used methods to the activities in each phase of the SDLC. Excel spreadsheets were used to structure the mapping and classification of the findings.

## 10.4. Results

The identified literature concerning user participation revolves around the approaches of “Participatory Design,” “Human Centered Design,” “User Centered Design,” “Ethnography,” “Contextual Design,” “User Innovation,” “Lead Users,” and “Human Resource Management”. The focus of this study is to explore opportunities and methods for user participation from these approaches, and not to compare the mentioned approaches as such. The following sections give provide an overview of practices for participation and used methods for user participation in each of the identified approaches.

### 10.4.1. User Participation in the Context of Participatory Design

From the perspective of Participatory Design (PD), users are considered equal partners to system developers and must participate in the decision-making process when a decision or change affects them. In this case, the users must have access to relevant information to obtain knowledge about technological options. They can then participate as advisors in specific design decisions where, for example, users can assess prototypes developed by the system developers, as representatives in the form of a selected small group of users who make design decisions, or through consensus agreements (Karlsson et al., 2012). According to Kensing and Blomberg (1998), the PD approach outlines five requirements for participation: access to relevant information; the possibility of taking an independent position on the problems; participation in decision making; the availability of appropriate participatory development methods; and room for alternative technical and/or organizational arrangements. In addition to this, PD allows users to participate in projects where specific systems are designed and new organizational forms are created. As members of project work groups and steering committees they are actively involved in activities for analysis of needs and possibilities, formulating system requirements, evaluating standard systems, selecting technology components, designing and prototyping new technologies, and organizational implementation. In some PD projects, steering committees are kept informed concerning the activities of the project work groups and may serve in an advisory capacity. Additionally, other organizational members can participate in arranged workshops (Kensing & Blomberg, 1998); whereby typical methods used in the PD approach are workshops and prototyping (Kujala, 2003), but also visiting other work sites, courses, lectures, supervised project work with organizational members, questionnaires, and interviews, to help employees to learn to evaluate the proposed technology and to gain a view of the relations between technology and work across organizations (Kensing & Blomberg, 1998). Reeder, Hills, Turner,

and Demiris (2014) recommend considering the constraints of work responsibilities and schedules of the participants, which limit engaging in a time-intensive design project. They have therefore conducted on-site interviews and used the information gained from the interviews to create a scenario-based design. Such design includes scenarios of use and personas.

#### 10.4.2. User Participation in the Context of HCD and UCD

Human-Centered Design (HCD) methods are applied in software development to achieve a usable system from the user's perspective (Maguire, 2001). The principles of HCD consist of the active involvement of users and clear understanding of user and task requirements, iteration of design solutions, and multidisciplinary design teams (Maguire, 2001). Several methods have been applied to support the process of HCD, according to Maguire (2001). Meetings with key stakeholders are relevant for usability planning and scoping. Methods for understanding and specifying the context of use are context-of-use analysis, survey of existing users, field studies, user observation, diary keeping, and task analysis. Methods for specifying the requirements are user-requirement interviews, focus groups, scenarios of use, personas, existing system/competitor analysis, task/function mapping, and allocation of function. Additional methods include brainstorming, storyboarding, card sorting, and paper/software prototyping for producing design solutions. For the evaluation of the design against the requirements, Maguire (2001) recommends applying participatory evaluation, evaluation workshops, evaluation walkthrough or discussion, assisted evaluation, controlled user testing, and satisfaction questionnaires.

Other than in PD, where users are viewed as equals to system designers, designers in User-Centered Design (UCD) take the role of system developers with extensive business knowledge, spending time with users in their working environment to better understand their requirements. Users participate in UCD as advisors or representatives (Karlsson et al., 2012). UCD is based on three principles: early focus on users and tasks, empirical measurement, and iterative design (Kujala, 2003). Early focus on users and tasks implies direct contact with the designers with potential users. Empirical measurement, such as scenario techniques with focus groups, helps to gain requirements for the initial design. Typical methods used in this approach are task analysis, prototyping, and usability evaluation (Kujala, 2003). A study of the most commonly used UCD methods ranks field studies, user-requirement analysis, and iterative design as more relevant than usability evaluation, task analysis, focus groups, formal heuristic evaluation, user interviews, prototype without user testing, surveys, informal expert review, and card sorting

(Vredenburg, Mao, Smith, & Carey, 2002). Salah, Paige, and Cairns (2014) recommend using an existing user pool, contacting user-recruiting firms, and conducting remote usability testing. Harte et al. (2017) argue that traditionally used methods such as interviews and surveys are resource intensive. They therefore derived a methodology to enhance usability in the HCD approach, which includes three phases: Establishing Context of Use and User Requirements, Expert Inspections and Walkthroughs, and Usability Testing with End Users. Furthermore, ethnographic observation (Karlsson et al., 2012) as well as simulations can be used to evaluate and analyze the design in a real work environment (Kujala, 2003). The ethnographic approach will be explained in more detail in the next section.

#### 10.4.3. User Participation in the Context of Ethnography

Ethnography focuses on the social aspects of human cooperation and emphasizes the social aspect of work (Kujala, 2003). The basic principles of this approach are the natural environment in which it takes place, the principle of holism implying the understanding of particular behavior in its respective context, and the members' point of view (Kujala, 2003). Typical methods used by ethnography are observation, interview, and video analysis. Open-ended (contextual) interviews and (participant) observations, often supported by audio or video recordings, help to develop shared views of the work, understand special work processes and behaviors (Kensing & Blomberg, 1998), and act as prompts for requirement elicitation as well as for system design (Kujala, 2003). Design ethnography is a new type of ethnography, where the ethnographer actively engages in this field with the users and designers. In this approach, ethnographic techniques used to find out user requirements are well combined with the design task itself, such as generating design and prototyping (Baskerville & Myers, 2015).

#### 10.4.4. User Participation in the Context of Contextual Design

Contextual design focuses as well on early design activities (Kensing & Blomberg, 1998) and combines methods such as observation and interview, in order to better understand employees in their work environment (Kujala, 2003). This contextual inquiry (interviewing method that combines observing and interviewing) helps to study work processes and optimize them. The interviews with potential users and other organizational members are guided during work to provide input to the product-definition process (Kensing & Blomberg, 1998). A prominent method in this approach is the "MUST" method, which implies cooperation between users, managers and internal IT professionals responsible for the design and implementation of the desired system. This method provides concepts and guidelines of technological and

organizational issues, such as the skills users need to work with the new technology (Kensing & Blomberg, 1998). Furthermore, field studies of work in combination with case-based prototyping are also described here as methods for work-oriented design.

#### 10.4.5. User Participation in the Context of UI or Lead Users

User Innovation (UI) or Lead Users is a quite different approach to creating user participation. Users in UI are the source for innovation, providing new ideas based on their needs and perceptions, identifying the design solutions and the problem, collaborating with developers, and taking responsibility for problems and solutions (Karlsson et al., 2012). This approach implies certain characteristics of users who can participate as Lead Users. Lead Users are up-to-date on market trends, and so anticipate relatively high benefits from obtaining a solution to their needs, and may innovate accordingly (Gales & Mansour-Cole, 1995). Lead Users participate in the improvement of existing products or with the initiation of the development of new products (Steen, Kuijt-Evers, & Klok, 2007). Employees who are Lead Users are defined as “embedded” users, more active than regular employees in acquiring, disseminating, and utilizing market-need information for corporate innovation (Schweisfurth & Raasch, 2015), but producing ideas of lower quality than do external Lead Users (Schweisfurth, 2017). Generally, Lead Users reflect their own needs; therefore, system developers build the final solution, in order to meet general user needs (Karlsson et al., 2012).

#### 10.4.6. User Participation in the Context of HRM

Employee participation strategy utilizing Human Resource Management (HRM) refers to four organizational processes: power, information, knowledge, and rewards (McMahan, Bell, & Virick, 1998). Power describes any form of decision-making within the organization, but outside of top management. This kind of decision-making is arguably participative decision-making. Information is considered as a source of power in the organization and refers to different methods of communication and knowledge transfer to coordinate and cooperate within the organization. Knowledge refers to the expertise, in the form of skills, abilities, and knowledge of the employees who should participate in an organization decision. Rewards are described as an instrument to achieve participation effectiveness. Bondarouk and Kees Loise (2005) argue that the contribution of the HR department plays an important role in the practical support of IT-innovation projects. HR should more actively intervene by maintain responsibility for explicitly defining job tasks, analyzing training needs, providing adequate user training according to those needs, and motivating potential users by establishing reward

systems. Albrecht, Bakker, Gruman, Macey, and Saks (2015) argue that employee engagement helps organizations to achieve competitive advantage. He recommends that HRM practitioners embed employee engagement in HRM policies and practices, such as personnel selection, socialization, performance management, and training and development.

Table 26 illustrates the typically used methods for participation in each of the identified approaches.

Table 26 Overview of participation in the identified approaches

Practices of Participation	Typical Methods Used
<b>PD</b>	
<ul style="list-style-type: none"> <li>• As advisors in specific design decisions</li> <li>• Assess prototypes developed by the system developers</li> <li>• As representatives in the form of selected small group of users who make design decisions</li> <li>• As members in project work groups and steering committees</li> <li>• In activities for analysis of needs and possibilities, formulating system requirements, evaluation of standard systems, selection of technology components, designing and prototyping of new technologies and in organizational implementation</li> </ul>	<ul style="list-style-type: none"> <li>• Workshops, prototyping, visit of other work sites, courses, lectures, supervised project work, questionnaire, and interviews.</li> </ul>
<b>HCD and UCD</b>	
<ul style="list-style-type: none"> <li>• As advisors or representatives</li> <li>• In meetings with key stakeholders for usability planning and scoping</li> <li>• By task requirements</li> <li>• By iteration of design solutions</li> <li>• In multidisciplinary design teams</li> <li>• By understanding and specifying the context of use</li> <li>• By specifying the requirements</li> <li>• For the evaluation of the design against the requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Context of use analysis, survey of existing users, field studies, user observation, diary keeping, task analysis , user requirement interview, focus groups, scenarios of use, personas, existing system/competitor analysis, task/function mapping and allocation of function, brainstorming, storyboarding, card sorting, paper/software prototyping, participatory evaluation, evaluation workshops, evaluation walkthrough or discussion, assisted evaluation, controlled user testing, and satisfaction questionnaires</li> </ul>
<b>Ethnography</b>	
<ul style="list-style-type: none"> <li>• By developing shared views on the work</li> <li>• By requirement elicitation</li> <li>• By system design</li> </ul>	<ul style="list-style-type: none"> <li>• Observation, interview and video analysis. Open-ended (contextual) interviews and (participant) observations, audio or video recordings</li> </ul>
<b>Contextual Design</b>	

<ul style="list-style-type: none"> <li>• By early design activities</li> <li>• By optimizing work processes</li> <li>• By providing input to the product definition process</li> </ul>	<ul style="list-style-type: none"> <li>• Contextual inquiry such as observation and interview together, "MUST" method, field studies of work in combination with case-based prototyping</li> </ul>
<b>UI or Lead Users</b>	
<ul style="list-style-type: none"> <li>• By providing new ideas</li> <li>• By identifying problems and design solutions</li> <li>• As responsible for problems and solutions</li> <li>• By collaborating with developers</li> </ul>	<ul style="list-style-type: none"> <li>• Initiation of the development of new products, improvement of existing products</li> </ul>
<b>HRM</b>	
<ul style="list-style-type: none"> <li>• By participative decision-making as source of power</li> <li>• By communication and knowledge transfer to coordinate and cooperate within the organization</li> </ul>	<ul style="list-style-type: none"> <li>• Explicitly define job tasks, analyze training needs, provide adequate user training, and motivate potential users by establishing reward systems</li> </ul>

### 10.5. Opportunities for Participation across the SDLC

Despite various differences between the private and public sectors, the introduction process of IT projects is usually similar and reflects steps of the SDLC (Rosacker & Rosacker, 2010). The SDLC offers a set of standard phases, a kind of template that can be used for further projects (D. Wirick, 2009). This includes project phases from the initiation to develop a system to its disposition or operation. A project phase helps to organize a project and to communicate about it and describes a set of activities. Each of those phases should end with the creation of a deliverable that can be evaluated and reviewed by the project stakeholder (D. Wirick, 2009). Deliverables are documents that can include a project plan, training manuals (D. Wirick, 2009), or system-requirement specification document (Laplante, 2014). The involvement of the stakeholder in the evaluation of the deliverables is crucial to making decisions on the continuation of the project and to identifying necessary changes. Furthermore, the review of the deliverables provides formal acceptance by the users (Westland, 2006). In general, the process consists of the broad project phases of initiation and planning, requirements definition and sourcing, design and development, deployment and operation-test, and finally the phase of operation and maintenance. This paper focuses specifically on participation across the whole process and maps practices and used methods for participation from the identified approaches to activities in each phase.

### 10.5.1. Participation in the Initiation and Planning Phase

The initiation phase provides many activities that are more strategic and begins with identifying business needs (Westland, 2006). This can be the development of a new system or the changing of an existing system. Lead users can participate in the initiation of the project by identifying such needs. Typically, top managers initiate such project initiatives. Nevertheless, the participation of other members in the organization at this early stage influence the decision-making process (Fariborz Damanpour & Schneider, 2006b). Further key activities in this phase are identifying stakeholders, developing a project concept that includes costs and risk analysis, planning for required resources and activities, and building project teams (Westland, 2006). A stakeholder analysis is established for identifying all members who may be impacted by this project. Employees can participate on steering committees as project leaders, members, and/or on work groups, and so are actively involved in different activities, such as analysis of needs and possibilities, project definition, and providing and reviewing the project plan. The active participation of all users is not possible and is limited to employee representatives, including managers, IT professionals, and work councils. Maguire (2001) recommends building user groups including end-users, supervisors, installers and maintainers, and other stakeholder such as marketing staff, purchasers, and support staff. Several aspects are critical in selecting representatives, such as skills and work experience. A formal request by e-mail is a typical way to recruit interested members of the project groups. To put in place some of those organizational features, it is useful to include the role of “change agent” in such a project structure (steering committee or project work groups) according to the theory of participation described in section 2. In addition, the information about the initiation of the project plays an important role for ensuring all employees’ participation. Information helps to inform and communicate with all organization members about the project intent, as well as its progress during the project life cycle. Simple ways of doing this include e-mails, information on the internal webpage, newsletters, or arranged workshops.

### 10.5.2. Participation in the Requirements Definition and Sourcing Phase

This phase is expected to be the most significant of all phases and includes the elicitation of user requirements, analyses the stakeholders and their needs, documentation, validation and management (Sharma & Pandey, 2014) and sourcing activities (Westland, 2006). Employees can participate directly in this process in different ways. For requirement gathering in the context of use analysis, questionnaires help to provide information about the characteristics of

the users, their tasks, and their operating environment (Maguire, 2001). Furthermore, participation as an interview partner, a member of focus groups, or other methods such as contextual inquiry and ethnography are well suited for studying the work processes in the real environment and specifying the requirements. Further activities such as user-training plans or concepts also begin in this phase and can be updated in subsequent phases (Pollard, Gupta, & Satzinger, 2010). HR departments, user representatives in the work project groups, as well as other members in the organization can participate in analyzing training needs, provide adequate user training according to these needs, and provide and evaluate training concepts. The reviewing of the deliverables, such as the requirement-specification document and training manuals, is a concern of the involved stakeholder project team as well as the involved end users, to ensure changes if they are necessary. After the decision to continue with the defined requirements, the sourcing activities begin. These activities deal mainly with procurement procedures such as requests for proposals, vendor evaluation, vendor selection, and contract documents/agreements (Westland, 2006). Those activities are mainly matters for project leaders and decision makers. Nevertheless, user representatives, such as employees with adequate skills and work councils, could participate by being informed about the process, inspecting the proposals and contract documents, and selecting the vendors.

### 10.5.3. Participation in the Design and Development Phase

During this phase, the application system is designed and developed according to the requirement specification. The developed system is tested in a separate test environment to ensure the functionality of the system and its installation into a production environment for the next phase (Pollard et al., 2010). The design phase is the central phase in all HCI approaches, the participation of the end users is critical in this process and through their early feedback, design changes can be made to ensure the development of a usable system. A range of design methods offers several opportunities for participation, particularly by the end users. From the contextual design, ethnography to participatory methods, the common methods used are interview, focus groups, scenarios of use, personas, existing system/competitor analysis, task/function mapping, allocation of function, and prototyping.

### 10.5.4. Participation in the Deployment and Operation-Test Phase

In this phase, the system is integrated in a pilot production environment to test it in a real environment with real users. The user-system tests are suitable for evaluating the system based on the defined requirements (Pollard et al., 2010). Usability tests, card sorting, as well as

questionnaires, observation, and interviews, are also suitable for obtaining feedback from the end users about the developed system in this phase. User training should be conducted and evaluated for eventual concept improvement before the rollout in the next phase.

**10.5.5. Participation in the Operation and Maintenance Phase**

This is the last phase and includes mainly the rollout of the developed system, the ongoing system operation, installation of system modifications (updates/releases), the maintenance of the system and support (Pollard et al., 2010). Feedback from the end-users on their routine work with the system, by questionnaire, interviews, and through communication with managers and work councils, helps the evaluation process on possible updates or maintenance. Furthermore, it is important for the employees to have institutional points of support for any questions about the implemented system or help needed.

Table 27 provides an overview of opportunities for employee participation across the SDLC by mapping practices of participation from the identified approaches in Section 4 on the main activities in each project phase.

Table 27 Opportunities for participation across the project life cycle in the public sector

Activities	Opportunities for Participation
<b>Participation in the Initiation and Planning Phase</b>	
<ul style="list-style-type: none"> <li>• Identifying of business needs</li> <li>• Identifying of stake-holders</li> <li>• Development of a project concept</li> <li>• Including costs and risks analysis</li> <li>• Planning of required resources and activities</li> <li>• Building project teams</li> </ul>	<ul style="list-style-type: none"> <li>• Lead users can initiate project initiatives by providing new ideas for the development of new products or improvement of existing products</li> <li>• Employees can participate in steering committees, as project leaders, as members of a project team and/or work groups, as advisors or representatives, and so are actively involved in different activities such as analysis of needs, project definition, and review of the project plan and further deliverables</li> <li>• Employee information about the initiation of the project via e-mails, information on internal webpages, newsletter, or arranged workshops</li> </ul>
<b>Participation in the Requirements Definition and Sourcing Phase</b>	
<ul style="list-style-type: none"> <li>• Elicitation of user requirements (requirements gathering and requirements analysis)</li> <li>• Development of user-training plans or concepts</li> <li>• Procurement procedures</li> <li>• Request for proposals</li> <li>• Vendor evaluation and selection</li> </ul>	<ul style="list-style-type: none"> <li>• In activities for analysis of needs and possibilities and for formulating system requirements</li> <li>• Provide information about the characteristics of the users, their tasks and their operating environment for requirement gathering</li> <li>• Provide input to the product definition process</li> </ul>

<ul style="list-style-type: none"> <li>• Contract documents/agreements</li> </ul>	<ul style="list-style-type: none"> <li>• As interview partner, member of focus groups, or for further methods within contextual design or ethnography</li> <li>• HR departments, user representatives in the work project groups as well as other members in the organization can participate for analyzing training needs, providing adequate user trainings according to these needs and evaluation of training concepts</li> <li>• Reviewing of the deliverables such as the requirement specification document and training manuals</li> <li>• User representatives such as employees with adequate skills and work councils participate by inspecting the proposals and contract documents and selecting the vendors</li> </ul>
<b>Participation in the Design and Development Phase</b>	
<ul style="list-style-type: none"> <li>• The application system is designed and developed according to the requirement specification</li> <li>• The developed system is tested in a separate test environment</li> </ul>	<ul style="list-style-type: none"> <li>• Assess prototypes, early feedback about the design, the functionality as well as the usability of the system</li> <li>• The common methods used for those activities are interview, focus groups, scenarios of use, personas, existing system/competitor analysis, task/function mapping, allocation of function, and prototyping</li> </ul>
<b>Participation in the Deployment and Operation-Test Phase</b>	
<ul style="list-style-type: none"> <li>• The system is integrated in a pilot production environment</li> <li>• Tests in a real environment with real users</li> <li>• Evaluating the system based on the defined requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Usability tests, card sorting, as well as questionnaires, observation and interviews are also suitable to get feedback from the end users about the developed system in this phase</li> <li>• Employees can participate in training activities and evaluate the training concept for eventual concept improvement</li> </ul>
<b>Participation in the Operation and Maintenance Phase</b>	
<ul style="list-style-type: none"> <li>• Rollout of the system</li> <li>• Ongoing system operation</li> <li>• Monitoring and evaluation of the system</li> <li>• Installation of system modifications (updates/releases)</li> <li>• Maintenance of the system</li> </ul>	<ul style="list-style-type: none"> <li>• Feedback from the end-users in their routine work with the system with questionnaire, interviews as well as through communication with managers and work councils help the evaluation process for possible updates or maintenance</li> <li>• Support during the system use (for any questions about the implemented system or help needed)</li> <li>• Knowledge sharing through communication</li> </ul>

## 10.6. Discussion, Implications and Conclusion

The analysis of the opportunities for participation in IT projects during the SDLC in the public sector illustrates a great potential to get employees engaging in this process. However, the findings of this study reveal that participation of all users is limited to the information, communication, training, support, and feedback about the introduced system in the operation phase. Additionally, most available opportunities for participation are those related to

requirement definition and system design. Participation theory differentiates participation activities in solution design, solution implementation, and project management participation activities. While project management participation activities are mainly used in the early project stages, such as the initiation phase, solution implementation activities are more the matter of later stages, such as design and implementation. Involving users in early stages of the SDLC allows detecting flaws of conceptual and design nature, minimize unnecessary development costs, and warrant relevance for customers (Alvertis et al., 2016). User participation in such early stages are considered to be more effective and can influence the subsequent stages (Muneera & Didar, 2015). Nevertheless, participation in form of information, communication, training and support are considered to be relevant factors that influence employees' adoption of IT in the public sector and should be investigated in future research (Ben Rehouma & Hofmann, 2018).

Employee participation in the public sector is argued throughout the literature as a critical adoption factor. The author believes that further research on participation from the employees' perspective investigating participation opportunities in IT projects in the public sector that increase their adoption of IT is required. Further challenges in this context are related to the management of user participation, identifying and selection of the appropriate participants from a group of stakeholder (Muneera & Didar, 2015) and identifying the barriers and motives behind participation (Thakurta, 2017). Furthermore, achieving effective participation requires the consideration of factors such as relaxing of deadlines, providing time off in lieu from daily work, allowing time for experimentation (Kensing & Blomberg, 1998) and rewards as compensation (Park, 2015). Further methods that can improve the participation rate in IT-projects in the public sector is to include agile approaches to engage developers and users to collaborate together in an iterative way and to identify lessons learned in the closed project to better manage next projects (Wirick, 2009). This challenge can also be addressed in future research, e.g., regarding the trend of agile IT development in the public sector.

The results of this study reveal that employee participation in IT project in the public sector should be managed carefully to receive the expected benefits. This paper provides an overview of possible opportunities for employee participation and should serve as a guideline for practitioners better operating with this issue in the future. The analysis identifies a wide range of opportunities for participation across the whole process, however there is also an absence of investigations of such opportunities in IT-adoption context.

This study has several limitations. First, the total number of the selected articles is limited due to the acknowledged criteria for inclusion. In addition, this research focused on participation from the perspective of the employees as users in the public sector. Therefore, future research could investigate further opportunities for participation in e.g. a qualitative approach and to identify needs from the perspective of other stakeholder such as managers and staff councils.

## 11. The Role of Public Sector Managers in Employees' Use of Information Technology

<b>Title</b>	The Role of Public Sector Managers in Employees' Use of Information Technology
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<b>Abstract</b>	The ubiquitous digitalization of work and work processes poses a challenge for public administration, as public servants need to adapt to the changes created by the increasing use of information technology (IT). The role of managers becomes crucial in the context of these profound changes to successfully address this challenge. However, it remains unclear what attitudes managers hold towards digitalization, what level of IT skills they have, and how their role in their employees' use of IT is perceived in practice. To fill this gap, we conducted semi-structured interviews with 16 employees and managers in public administration from all federal levels in Germany. The results show that employees perceive themselves as more open toward and enthusiastic about the opportunities offered by the widespread use of IT than their managers. At the same time, managers are ascribed a significant role in the process of digitalization as role models and key communicators.
<b>Keywords</b>	Digitalization, IT adoption, Leadership, Manager



## **The Role of Public Sector Managers in Employees' Use of Information Technology**

### **11.1. Introduction**

Public sector organizations around the world are attempting to leverage digitalization to provide effective and efficient public services (Liu & Yuan, 2015). Digitalization efforts are not only targeted at external stakeholders such as citizens but also impact internal processes (Lindgren & Van Veenstra, 2018). While digitalization offers numerous benefits for public sector organizations, it is also associated with major technical and organizational challenges, and many digitalization projects in the public sector are prone to failure. The reasons for these failures are manifold and include challenges related to information and data quality, information technology (IT), the organization and its management, legal frameworks and regulations, and institutional and environmental factors (Ramó N Gil-García & Pardo, 2005). One major problem when introducing new IT in organizations is resistance to change (Lapointe & Rivard, 2005; Laumer & Eckhardt, 2012), an issue which also arises in IT projects in the public sector (Ashraf et al., 2010; Cinar et al., 2019; Kumar & Saha, 2017). Many digitalization projects in the public sector fail because employees are not willing to use the new system due to, for example, a lack of knowledge and skills or a fear of being replaced by technology and losing their jobs (Ben Rehouma, 2018). Research, however, shows that digitalization projects can only be successful if they are supported by employees at all levels of the hierarchy (Fernandez & Rainey, 2006). Digitalization is thus both a management and a technical endeavor (Distel, 2016).

In this context, managers assume a key role as organizational leaders, as they must oversee and accompany organizational change (F. Damanpour & Schneider, 2009). However, they often do not have the digital competences necessary for a successful change (Distel, 2016). Various studies have pointed out that managers are not only assigned responsibility for digitalization projects but also have a significant influence on how employees deal with digitalization changes in their organizations. For example, managers in the public sector have the crucial function of encouraging their employees to become innovators (F. Damanpour & Schneider, 2009) and can have a considerable impact on their employees' use of digital technologies (Lewis et al., 2003). They also need to ensure and support their organization's IT implementation process (Van Wart et al., 2017). However, it remains unclear whether managers see themselves as having (and whether they actually have) the capability to be ambassadors of innovation, given that they

often lack education and experience in digitalization projects and thus are often challenged by the implementation of various digitalization requirements (Eggers & Hollmann, 2018).

Although the role of managers has been widely discussed in several fields, research on managers' roles in digitalization in the public sector remains scarce. It is unclear how managers' roles in their employees' use of IT are perceived in practice. Thus, this article addresses the following research questions:

- 1) How do public sector managers perceive their roles in their employees' use of IT?
- 2) How do public sector employees perceive their managers' roles in their own use of IT?

In order to answer these research questions and capture these groups' self-perceptions and perceptions of others, we conducted qualitative interviews with public sector managers and employees without management responsibility in Germany. Insights from this exploratory study contribute to both research and practice, as they shed light on the perceptions of managers' roles in employees' IT use in the public sector. This study reveals the critical role of managers in this context, especially as role models for the use of IT in their agencies. This also results in valuable findings for practice - for example, reinforcing internal information and communications measures, ensuring adequate participation in decision-making processes, and providing intensive support in using IT.

The article is structured as follows. Section 2 introduces the exploratory research design applied in this study. Since little research has been carried out on this issue to date, we took an explorative approach and conducted qualitative interviews with public sector managers and employees in Germany. Our methods of data collection and analysis as well as excerpts from the interview guidelines are presented in section 3. The interview guidelines were based on existing theories on leadership and management digitalization in the public sector (see section 2). Subsequently, in sections 4 and 5, we present the results of these interviews and discuss our insights with regard to current digital government research and practice. Our main contribution is the derivation of recommendations for public sector managers to increase the use of IT among their employees.

## 11.2. Related Work

Research on the role of managers is especially influenced by leadership theory. Leadership has been defined in different terms such as the aggregation of certain traits, skills, and behaviors

(Wart, 2003a) but also in terms such as influence, interaction patterns, role relationships, and occupation of an administrative position (Aalateeg, 2017). Although defining leadership appears challenging (Zakeer Ahmed, Allah, & Irfanullah, 2016), Aalateeg (2017) proposed that “leadership is dyadic and dynamic process, where leaders understand and professionally influence followers to transcend self-interest the greater good of the organization, through motivating, inspiring a shared vision, and supporting higher level of need of the followers; and defining a competent rewarding system, so as achieve the challenging organizational goals, effectively and efficiently, through collective efforts” (Aalateeg, 2017, p.36). In contemporary research, the main leadership theories are the transactional and transformational leadership theories (Orazi, Turrini, & Valotti, 2013). The transactional school is management oriented, representing management interest in promoting and maintaining productivity. Transactional leaders use pecuniary incentives such as rewards and punishments to create a strategic alignment with their subordinates (Orazi et al., 2013). In contrast, the transformational school of leadership has a change orientation, emphasizing leaders who are visionary, entrepreneurial, and/or charismatic (Wart, 2003a). Transformational leaders interact with their followers based on common values, beliefs and goals (Zakeer Ahmed et al., 2016). For a successfully leadership, Aalateeg (Aalateeg, 2017) argued that leaders must take certain actions, such as articulating vision, role modeling, and setting goals. In comparing managers versus leaders, the author concluded that leaders and managers both are essential for an organization, where leaders turn vision into action, while managers complete tasks. Accordingly, managers should incorporate the leadership component of their works to become leaders (Aalateeg, 2017).

Van Wart (Wart, 2003b) discussed leadership in the public sector in depth and defined administrative leaders as “the frontline supervisor (or even lead worker) to the nonpolitical head of the organization” (Wart, 2003b, p.216). Administrative leaders are public servants who have the personal characteristics, competences, knowledge, and experiences to create transformation and influence change at both the individual and organizational levels (Rusaw, Van Wart, & Dicke, 2008). However, research on leadership and managing organizational changes in the public sector often leaves out the area of digitalization.

The term “digitalization” refers to the ongoing adoption of digital technologies across human and societal activities and its consequences (Ogonek & Hofmann, 2018). It entails the use of digital technologies, the assessment of possible enablers and barriers to use of such technologies, and personal attitudes towards digitalization (Niedzwiecka & Pan, 2017). The implications of digitalization for an organization’s leadership rely on the ability of managers to

implement digitalization (S. Khan, 2016). A new concept in leadership theory called “e-leadership” emphasizes the importance of digitalization and leadership in an organization. Based on this concept, (Van Wart et al., 2017) argued that leaders as direct users of IT can not only improve their own effectiveness but can also influence others by serving as role models through their personal use of IT. Leadership in this context requires new attitudes, skills, and knowledge (Goethals, Sorenson, & Burns, 2004).

Work processes, communication channels, and previous ways of using media are changing in the public sector through digitalization (Ben Rehouma, 2018). In order to successfully respond to the changes created by digitalization, employees need to develop new qualifications and skills. This includes, in addition to technical competences, a general openness to change, a willingness to embrace continuing education, and socio-technical competences that convey a “digital mindset” and enable employees to control and shape the changes brought about by digitalization beyond mere software training courses (Ogonek et al., 2016). However, it is often exactly these competences that are lacking among public sector employees and managers and that are insufficiently exemplified by managers. Managers must improve their own digitalization skills before they introduce their employees to digitalization projects (Eggers & Hollmann, 2018).

### 11.3. Methods

The present study takes a qualitative approach, as the role of managers in employees’ use of IT has not yet been researched in depth. In order to obtain initial insights into the topic, we conducted 16 semi-structured interviews with employees and managers at public institutions at all federal levels in Germany. We developed two different sets of guidelines: one for managers and one for employees. The guidelines were developed based on the existing literature and included four major sections (see Table Table 28 Interview Guideline). After a short introduction, which aimed to get to know the interviewee, we asked interviewees about their attitudes toward digitalization and their IT skills. This section aimed to understand respondents’ perceptions of managers’ attitudes toward public sector digitalization and their assessment of their IT skills. The third block centered on the role of managers in employees’ use of IT. We were interested in understanding interviewees’ perceptions of managers’ roles regarding the use of IT in their organizations, as well as whether and how employees’ and managers’ perceptions of this role differed. The interviews ended with a short conclusion and summarizing questions.

Table 28 Interview Guideline

<b>Part</b>	<b>Aim</b>	<b>Example Questions</b>
Introduction	<ul style="list-style-type: none"> <li>To make it easier for participants to start the interview, to build a stable basis for further conversation, and to create a pleasant discussion atmosphere.</li> </ul>	Could you please briefly introduce yourself and your position in your organization?
Participants' attitudes toward IT and their IT skills	<ul style="list-style-type: none"> <li>To understand participants' perceptions of their own attitudes toward public sector digitalization and of their own IT skills as well as those of their counterparts.</li> </ul>	<p>What is your attitude toward digitalization?</p> <p>How do you assess the attitudes of your manager/employees toward digitalization?</p>
Managers' roles in employees' use of IT	<ul style="list-style-type: none"> <li>To understand participants' perceptions of managers' roles in employees' use of IT and to understand whether and how employees' and managers' perceptions of managers' roles in employees' use of IT differed.</li> </ul>	<p>What role do you have as a manager regarding the IT use of your employees?/What role does your manager have regarding your IT use?</p> <p>How do you support your employees regarding the use of IT?/How does your manager support you regarding the use of IT?</p>
Closure	<ul style="list-style-type: none"> <li>To address open issues and to summarize the interview.</li> </ul>	Do you have any further questions or comments?

The average interview duration was approximately 26 minutes, with the shortest interview lasting 14 minutes and the longest lasting 52 minutes. The first four interviews were conducted by two researchers so that any necessary adjustments to the interview guidelines could be made; all further interviews were then conducted by one person. Of these 16 interviews, we conducted four with representatives at the federal level, two at the state level, and 10 at the local level. Most of the interviewees worked as managers (n = 10) in teams of five to 300 employees. Among employees (n = 6), the number of employees in their team ranged from one to 230.

We coded the interview transcripts according to categories (Krippendorff, 2004) developed deductively based on the interview guidelines as well as inductively. This scheme was used to record the attitudes and assessments of the interviewees that were relevant to the research questions. This included assessing interviewees' personal attitudes, IT skills, and perceptions of managers' roles in employees' use of IT, as well as naming and evaluating the management measures used in this context. In some parts, we used the coding scheme to record respondents'

assessments of their counterparts (i.e., employees were asked to assess their managers and vice versa).

## 11.4. Results

### 11.4.1. Perceptions of managers' roles in employees' use of IT

In order to better understand public sector managers' roles in employees' use of IT, managers and employees were also asked to assess their own attitudes toward digitalization and their IT skills, as well as those of their employees or managers, respectively.

#### *Managers' self-assessments*

All interviewed managers assessed their own attitudes toward digitalization as open and positive. The following statement, for example, supports this finding: "I am totally open and ready and I am looking forward to the future tasks. I think that's great. It's also fun." Another interviewed manager assessed his attitudes toward digitalization as extremely positive and described digitalization as a future technology: "Extremely positive. I consider this to be an absolute future technology." Most of the interviewed managers assessed their own IT skills with less enthusiasm. Some managers described themselves as having "very" low-level skills and saw themselves in this context purely as users with limited abilities. One interviewed manager, for example, described his IT skills as follows: "I am a pure administrative person. I still don't know how telephone services work. So my abilities to judge IT or whatever are very, very low or at a medium level." A further statement supports this finding: "I'm more of a user now, so I can use the Internet as a source to get information, but I have at this point no special computer knowledge."

#### *Employees' self-assessments*

The interviewed employees assessed their attitudes toward digitalization as positive. Although almost all interviewees had a positive attitude toward digitalization, this attitude was not uncritical. One interviewee, for example, described his attitude as follows: "Well, I belong to the curious variant of humankind that tries everything out to at least be able to: a) have a say afterwards, and b) say 'Yes, I think it's good' or 'No, I reject it, for this or that reason.'" Another interviewed employee also supported this critical view: "I have a very positive attitude toward it, even if it is still critical." Unlike the managers, the interviewed employees assessed their IT skill levels more positively as medium to high. One statement, for example, described this assessment as follows: "Assuming there was a scale of one to 10, [with] one was very low and 10 very high, I would put my personal IT skills at eight." However, some respondents related

their good IT skills to their use of standard programs such as Word or Excel and stated the limits of their abilities. For example, one employee described his IT skills as follows: “Medium to good, Office applications good...with new things, I need a moment.”

#### *Assessments of counterparts*

In addition to personal attitudes and IT skills, interviewees were also asked to assess the attitudes and IT skills of their employees or managers, respectively. Their attitudes toward the other party differed and were assessed much more critically and, to some extent, negatively. Most of the interviewed managers referred to two groups of employees based on their ages: one group composed of those with positive attitudes towards digitalization and the other including reluctant employees with negative attitudes. Statements supporting this finding include, for example: “Depending on age. Older employees who know how to act in the traditional way, written procedures, written communication, [are] somewhat more reserved. Younger employees take this for granted.” Employees assessed their managers’ attitudes more positively but also more critically. Although most interviewed employees assessed their managers’ attitudes as generally positive, one respondent described his managers’ views of digitalization as a “threat”: “It really is the case that I have encountered such resistance in my daily work that I can’t think of any other attribute or any other perception [except] that it must really appear as a threat to the managers. How else can you explain why you resist it so much?”

A similar pattern can be seen in respondents’ assessments of their own IT skills versus those of their colleagues and managers. While the interviewed employees assessed their own IT abilities positively, their assessments of others’ abilities were clearly mixed and more negative.

It should be emphasized here that most respondents saw themselves and their colleagues or managers as purely users who lacked background in or detailed knowledge of IT. An employee negatively assessed their manager’s IT skills, for example, as follows: “So you have to explain to your boss from time to time how to deal with IT.” A comparison of the assessments also showed that employees attributed better IT skills to themselves than to their managers - for example: “But it is more likely that our superiors [will] ask us how the program works, because in the end, we work with it more than the superiors; they have different tasks.” Here, the interviewees again saw a connection between employees’ ages and the question of how IT is used in everyday professional life: “I think I have an advantage over some older colleagues because I’m simply well versed in IT and have grown up with computers and the Internet.”

#### 11.4.2. Reasons for these assessments of attitudes and IT skills

Most of the interviewees with positive attitudes toward IT related this attitude to their perceptions of the positive effects of digitalization, such as better structuring and optimization of administrative processes and the associated increase in the efficiency and effectiveness of administrative work. One statement supporting this finding was as follows: “I think that they probably, just like me, see this as a way to make their work easier. Also, for example, paper files; if someone moves, this file has to be sent from one social center to another, mistakes can happen. If the file arrives too late or disappears in the mail, this happens very rarely, but sometimes it happens that you just can't find a file. If everything were to be accessible digitally - yes, everything digitally - you would not have this problem.”

In addition, older age seemed to be associated with low IT skills and a more negative attitude toward IT-induced changes. One interviewee's statement serves as an example for this finding: “I know the reasons that are negative. The age structures in the administrations, also in our administration, are such that there are a lot of young people and many who will retire in the next three to five years. What is missing are middle-aged people. And many older colleagues simply don't feel like changing their habits, they simply say, 'I don't want this anymore. I do not want that, it is enough for me as it is.' And that's where the negative touch comes from.”

Other interviewees observed resistance to change in general as the reason for a negative attitude toward digitalization, which seemed to exist across different hierarchical levels and age groups: “I noticed at the beginning that the employees were very defensive because they simply didn't dare to do that.” Although respondents assessed colleagues' attitudes much more negatively than their own, there were also (albeit far fewer) positive assessments: “We have several projects underway in the company and the staff council, which is always particularly important in a public authority, and is also very much in agreement with the digitalization we are carrying out here. This can be seen from the fact that they do not complain. After all, the council always complains, and rightly so, and it is paid for it when colleagues turn to it... That is not happening here. I have not yet had to hold these talks, and so they seem to have found a way that is also accepted by the staff.”

#### 11.4.3. Assessments of managers' roles in employees' use of IT

The responses regarding managers' influence on their employees' use of IT were contradictory. Whereas employees did not perceive that their managers had any influence on their own use of IT, managers saw themselves as pioneers of digitalization in their departments. All interviewed

managers agreed on the positive impact they perceived themselves to have on their employees' use of IT. One interviewee stated, for example: "100 percent influence, absolute[ly]." Some of the interviewed managers described their roles as lead users and providers of new ideas to support the progress of the digitalization process in their departments - for example: "I have worked in a federal administration, I have worked also in very large authorities and had the idea: Well, some things can be implemented in a small authority." Another manager stated: "I believe in a very strong influence, because in the end it is me in this department who determines the processes. And when I worked toward a strong digitalization of the processes, this was also taken up and accepted in the department. So I think my influence has been very strong." Other interviewed managers assessed their influence by applying several management measures, such as regularly informing their employees, communicating with them, and providing transparency: "I ascribe very, very great importance to information and transparency."

Although employees did not perceive any direct influence of their managers on their use of IT, the interviewees also saw it as part of managers' responsibilities to serve **as role models** who actively demonstrate the use of IT for their employees. From managers' perspectives, they already fulfilled this role: "I have never experienced as much as in public administration that a manager really has a role model function." Most interviewed managers argued that incentives for employees could be set by their own actions. One interviewed manager stated, for example: "So, if the boardroom brings the whole thing forward, it will affect everyone else. The role model function is just there, and if you then have people who understand it, who inspire others for whatever tools, or those who somehow show the positive benefits, then that's very important. The role model is very important, yes." This also meant, at least from the perspective of one interviewee, that managers themselves should regularly attend trainings.

#### 11.4.4. Management measures to improve employees' use of IT

The interview results indicate that managers' roles in employees' use of IT should imply engagement in management activities such as **informing** employees about upcoming changes during each step of the change process and **actively communicating** with them. This also includes promoting an approving attitude toward the active use of new IT. In addition, some interviewees emphasized that it was important to communicate decisions on IT-related changes as explicit decisions made by management in order to make clear their binding character. Next to traditional communication media such as email and informational meetings, many of the interviewed employees preferred personal conversations with their respective colleagues or managers: "Informing the employees on time. I would find it important that if they have more

information that they are allowed to pass on, that they will do this [in a] timely [manner]. Maybe in a staff meeting, which we have once a month, that they will say then, ‘We have received information that the e-file will probably be here in half a year, just so that you know.’ I mean that the superiors pass on the information to us that is approved on time.”

Furthermore, many interviewees regarded the **adequate participation** of the respective employees in the overall decision-making and implementation process as key to the successful introduction of IT. In order to address concerns as early as possible and to address technical requirements, employees should be involved - at least at certain points - in the process, from idea generation to the selection of adequate products to the actual implementation: “That’s why we organize several presentation meetings where experts always participate who try to explain their needs prior to these presentations, and then to find that their needs are considered in these presentations and the selection of the respective IT. Well, when it is about software, [the selection] also takes place with the affected persons, never without them. And since this is the case, they have a totally different relationship to their software and are typically happy with that.”

Many managers also tried to **motivate** employees to actively use IT in their daily professional lives. This was mostly done by highlighting the benefits of using IT versus the more traditional ways of working, by citing successes, by regularly exchanging opinions with everyone involved (including beyond the introductory phase of IT), and by fixing errors and improving the system together.

Especially during the introductory phase, many interviewees relied on **regular trainings** to handle the new systems, but they also saw a continuing need to provide training for standard applications. Some interviewees also saw the provision of needed resources as a success factor in the introduction of new IT. The availability of sufficient funds could thus create incentives for employees to make full use of existing IT. “[That’s where] I always try to allocate a lot of money in the budget for training. I think that’s a very important topic; external training, but also in-house training. Since I always tell people to have a look, find the areas that interest them, and then we discuss it briefly, and they can go there. For that, I always try to include as much money as possible in my budget planning, and that actually works well.”

Most interviewees, both managers and employees, generally regarded most of the applied measures as positive. Nevertheless, there were also problems with the implementation of digitalization. In particular, **managers expressed self-criticism** regarding the regularity of communication and information measures: “It is a bit difficult to evaluate, because by being in charge, we are also those who communicate about it, motivate others, support others, and

include others. I would say that this is in need of improvement. So, we informed, we did info events, posted on the intranet, emailed, but you'd probably have to point out more regularly, ask more frequently, if it works that well, or if it should be changed somehow." This was also associated with the fact that managers, in particular, viewed the sustainability of the measures as in need of improvement.

However, the greatest problem from the employees' point of view was **lack of support from managers**. Many interviewees reported a lack of support from their superiors, who did not attach any importance to the topic of "digitalization of the administration" and thus did not make much-needed resources available. According to the interviewees, important processes were not only slowed down but completely prevented: "It is really true that...other institutions that specialize in this area recommend that in a municipality...there should be, in addition to productive IT, something like an IT control. That is, someone who looks from above on the institution, on the structure, on the system. These are all very important decisions - precisely because a lot is changing - there must actually be someone who is also at the very top of the hierarchy, who also has equivalent powers and competences to make such decisions...But no one thinks like that here...and the managers have no awareness of what's needed. They are dealing with completely different things. But not with digitalization decisions or with IT processes, control, decisions, or anything like that...The only thing that always comes up is the mayor, who says 'The district administrator has a nicer cell phone than me, can I have such a device, too?' That is all they are worried about. I, myself, am amazed and astonished by how all this can be, so if you do not...have blinkers on the right and left, and open eyes and ears, then the keyword digitalization is everywhere...But I'm amazed at how this gets past the executives, and I can only explain that with very strong defensive and self-repressive mechanisms."

## 11.5. Discussion

Our findings show the important role that managers play in supporting digitalization changes in the public sector. Managers play an exemplary role with regard to digitalization in the public sector and thus influence how their employees deal with digital technologies. Even if employees do not perceive their managers as having any direct influence on their own use of IT, they argue that managers play a critical role in this context. Managers are aware of their responsibilities in this process as well as their influence on employees' use of IT in their departments. This finding is particularly interesting given that the vast majority of interviewees emphasized that managers must act as role models in order for new IT to be accepted by the workforce. While many of

the interviewed managers also fulfilled their roles as role models from their point of view, employees seemed to perceive this less clearly. Our results emphasize the critical role that managers play in the public sector by, on the one hand, acting as role models and, on the other, using a variety of management techniques - including information, communication, motivation, support, participation, and training - to reduce employees' fears when using IT and to address possible resistance prior to introducing new IT.

These findings are in line with prior studies emphasizing the role of managers in different contexts, especially regarding the success of changes and IT adoption in the public sector. In terms of the role model status ascribed to managers, (Fariborz Damanpour & Schneider, 2008) showed the significant influence of managers' personal characteristics - such as their attitudes towards digitalization and their decisions about and adaptation to digital technologies in their organizations - on employees' acceptance of digitalization in the public sector. In addition, Niedzwiecka & Pan (2017) discussed how managers' statuses as role models with regard to their personal use of IT could influence others' use of IT.

Our findings indicate how important it is for employees that their managers inform them about the introduction of IT, communicate with them on this issue, motivate them to use IT, and support them in using IT. The success of the implementation of new programs depends heavily on managers' abilities to inform their employees about the change and convince them of its value, as well as to involve employees in the change process (Fernandez & Rainey, 2006). (Ragu-Nathan et al., 2004) argued that more support from managers is associated with greater integration of digital technologies. Managers can motivate their employees by creating and ensuring a good work and social climate, improving morale, and encouraging and rewarding innovation (Fariborz Damanpour & Schneider, 2008). In this context, the support of managers - especially top management - contributes to motivation and signals the expectation of cooperation between organizational units in order to facilitate the integration of digital technologies. Clear communication about expectations related to the use of digital technologies and the benefits and implications of digitalization is crucial for the use and adoption of digital technologies in the public sector. Public sector managers should not only develop a strategic vision but also communicate it to their employees and motivate them to achieve it (Fernandez, Cho, & Perry, 2010). Effective communication about technology enables the exchange of information about the benefits of using this technology and leads to trust and adoption of this technology (Amoako-Gyampah & Salam, 2004b). The aim here is not only to communicate and address the advantages of digitalization but also to eliminate negative implications, such as parallel operations and the feeling of strain (Ben Rehouma, 2018).

In addition to these management activities, our results demonstrate that it is important for employees to participate in the digitalization process in order for them to use IT. This is also in line with prior studies on managers' role in the public sector. For example, (Fernandez & Rainey, 2006) regarded the widespread participation of members at different levels of an organization during all stages of the change implementation process as an important measure that managers can take to overcome employees' resistance to change in the public sector. Other issues that have been discussed in this context include providing sufficient resources, developing strategies, communicating needs, training employees, developing new processes and practices, and testing and experimenting with innovations. Managers and employees must institutionalize changes by incorporating these changes into their work routines (Fernandez & Rainey, 2006). For this reason, it is important for all employees, whether managerial or not, to accept and learn from their weaknesses. It should not be shameful to accept and communicate one's own insecurities regarding the use of digital technologies. Instead of hiding their lack of knowledge and consequently failing to take advantage of digitalization opportunities, employees and managers should address problems and learn from their mistakes. It is important to create a culture of open communication that does not judge the weaknesses of others in dealing with digital technologies and allows for greater mutual support.

In the public sector, leaders should adopt transformational leadership styles (Orazi et al., 2013) and approach change with a focus on appreciating and responding to staff fears and concerns (Coram & Burnes, 2001). Our analysis indicates that managers in the public sector follow a transformational leadership approach, which implies that leaders set visions and goals for their organizations, consistently communicate them to their subordinates, and motivate them to achieve these purposes. In contrast to the transactional approach, they use non-pecuniary incentives such as persuasion and inspiration, create a relationship with their employees based on value sharing and the development of trust, and encourage employees' participation. This approach has modified the functionality of leadership to be a dynamic role that produces adaptive and useful change in organizations (Wart, 2003a).

## 11.6. Conclusion

Public institutions worldwide have made efforts to render their internal and external processes more efficient and effective through the use of IT. However, this digital change is accompanied by changes in (traditional) workflows and communication channels, as well as the constantly changing use of digital technologies in this sector. Various studies indicate that managers are not only responsible for digitalization projects but should also have a significant influence on

how their employees handle and adopt digital technologies. Although managers should act as change agents and leaders to ensure the success of digitalization changes in the public sector, to date, it has been unclear how managers' roles are perceived in practice. Therefore, the aim of this study was to identify how public sector managers perceive their influence on and roles in employees' use of IT and how public sector employees perceive their managers' roles in their own use of IT.

To this end, we conducted 16 interviews with employees and managers from public institutions at all three federal levels in Germany between March and June 2018. Previously developed interview guidelines covering the topics of attitudes toward digitalization, IT skills, managers' influence, and managers' roles were designed to ensure that the results of the interviews remained consistent.

Managers' attitudes toward digitalization can overall be considered positive. Managers were open to digitalization and appreciated its benefits but were far from uncritical. Most respondents were positive about digitalization because they saw its possible effectiveness and efficiency gains, but many were more reluctant and critical. In addition, our results show that negative attitudes toward digitalization and low IT skills were often associated with older age.

This study also shows that managers play a crucial role in employees' use of IT in the public sector. Even if most of the interviewed employees did not perceive this influence directly, they supported these findings by specifying managers' roles regarding the use of IT in their organizations. Managers can exert influence through being active role models, as well as engaging in early and continuous communication and information efforts with employees. The aim is not only to equip employees with the appropriate IT but also to encourage them to continuously learn and be trained and to see those efforts as an investment in the department or institution and in the digitalization process as such. The role of manager is essential for the success and acceptance of digitalization in the public sector. However, digitalization cannot be regarded as a one-off, independent, individual project; rather, it is a cross-departmental or cross-sectional task that encompasses all levels and areas of responsibility and can only be successful if all parties work together. IT decisions should thus also be seen as management decisions and communicated accordingly to create broad acceptance and commitment.

A central success factor is the creation of an open organizational culture in which perceived "weaknesses" can be openly admitted and a courageous approach toward digitalization is rewarded. Managers, in particular, should not only be forerunners for digitalization initiatives in early stages but should also act as role models for digitalization because of their formative influence on their employees, play an active role in shaping the process, and use active and

early communication and regular provision of information to overcome any reluctance and fears. Future work in this field should focus specifically on this aspect. Based on this and the results collected, we summarize the main recommendations for managers as follows:

- Early information and participation of the people involved: Above all, it is the task of managers to inform employees at an early stage about planned digitalization initiatives and their implications.
- IT decisions as management decisions: Decisions regarding digitalization initiatives have to be conveyed by management so that they are perceived by employees as more binding.
- Training and encouragement: Managers should encourage their employees to attend digitalization trainings and, if necessary, provide incentives. On the other hand, when employees themselves express a desire to attend trainings, managers should be open minded and should not view that investment as lost time.
- Participation in management training: Managers themselves should make greater use of digital training courses.
- Actively living digitalization: Perhaps most importantly, in order to fulfill their roles as role models for their organizations, managers should actively demonstrate the use of digital technologies. This includes both using IT and communicating this to employees.

Based on our findings, there are also some key facts which can be summarized into the following recommendations for all employees:

- Accept and learn from weaknesses: For all employees, it should not be shameful to accept and communicate one's own insecurities regarding the use of digital technologies. Instead of keeping missing knowledge a secret and thus failing to take advantage of digitalization opportunities, employees and managers should address problems and learn from their mistakes.
- Greater mutual support: The willingness of both employees and executives to support each other in dealing with digital technologies is very important.
- Call for more support: Both executives and employees should ask for support in dealing with IT - for example, training courses.
- Creating a culture of open communication: In order to implement the aforementioned recommendations, all employees should contribute to creating a culture of open communication that does not judge others' weaknesses in dealing with digital technologies.



## 12. Uncovering the Multifaceted Concept of Digitalisation: How Do Researchers and Practitioners Define Public Sector Digitalisation?

<b>Title</b>	Uncovering the multifaceted concept of digitalisation: How do re-searchers and practitioners define public sector digitalisation?
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<b>Abstract</b>	<p>For decades now, the public sector employs information and communication technologies (ICT) to enhance the effectiveness and efficiency of both internal processes and interactions with external stakeholders. Ever since, researchers have investigated potentials and consequences of the widespread use of ICT in the public domain. However, they do so by referring to the same phenomenon under a multitude of labels, such as digitalisation, e-government, and – lately – digital transformation. Similarly, practitioners use different words to describe the similar or same process: the widespread use of ever more sophisticated technologies within public administrations. This article sets out to uncover the different meanings of the terms ‘digitalisation’ and ‘digitisation’ both in research and practice. We apply an exploratory approach and conduct a structured literature review to account for the use of both terms in research. To uncover different meanings of the terms in practice, we conducted 16 semi-structured qualitative interviews with public servants from different administrative levels. Results of both analyses provide insights into existing ambiguities related to the use of these terms in a public sector context. Neither researchers nor practitioners seem to share a common understanding of what digitalisation and digitisation, respectively, are. In total, we derive eight different themes to which researchers and practitioners are referring when using the terms digitalisation or digitisation. Our analysis highlights the need for a more stringent use of terms such as these and the need to be more explicit about the meaning attached to commonly used concepts.</p>
<b>Keywords</b>	Digitalisation, digitization, digital transformation, e-government, digital government, conceptual research



## Uncovering the multifaceted concept of digitalisation: How do re-searchers and practitioners define public sector digitalisation?

### 12.1. Introduction

Digitalisation has been coined as a well-used term for everything that concerns the use of IT and the consequences in practice and research. The term appeared for the first time as “digitalization” in 1971 summarizing discussions on its societal and social implications (Brennen & Kreiss, 2016). While practitioners and researchers have used various terms for phenomena related to the use of ICT, digitalisation is used most frequently from the beginning of the 21<sup>st</sup> century and addresses implications of new technologies on social interaction, the global economy, and society (Strader, 2011).

The term has also found its way into the debates on the use of ICT in the public sector mainly using the label “e-government” and sometimes related terms such as “digital government” (Liu & Yuan, 2015). E-government emerged as a domain on its own within IS research at the beginning of the new century and is considered as a domain of significant interest to both researchers and practitioners. The term refers to “the use of information technology to enable and improve the efficiency with which government services are provided to citizens, employees, businesses and agencies” (Bélanger et al., 2012). Chun, Shulman, Sandoval, & Hovy (2010) describe digital government as a synonym to e-government as a new form of public organization that supports and redefines the existing and new information, communication and transaction-related interactions with stakeholders through ICT. However, the use of the term ‘e-government’ and its variations decreases since 2016 in favor of the term “digitalisation” as is indicated by (Trends Google, n.d.). Accordingly, scholars increasingly use the substitute ‘digitalisation’, ‘digital transformation’ or digitization when referring to the use of ICT in public organisations. Even some research journals and libraries were renamed, for example the **EGRL** (**E**lectronic Government Reference Library) has been renamed to **DGRL** (**D**igital Government Reference Library) in 2019.

Whereas some researchers (e.g. (Finger & Pécoud, 2003)) argue that digitalisation is synonym to e-government, others use the term digitalisation for describing issues within the public sector that are not only geared towards the (more efficient) provision of public services. For example, digitalisation in the public sector refers to tools used to promote efficient administration and convenient public services and to overcome a lack of manpower (Chiang & Hsieh, 2007). Other scholars use the term to describe how governmental work is made more visible to citizens

(Orita, 2005). It may also refer to means for enhanced public services and improved performance (Bernhard, Norström, Snis, Gråsjö, & Gellerstedt, 2018) and is named as a way to improve the efficiency of the public sector (Lemmetti, 2016). Some authors discuss 'digitalisation' in terms of an intensive information flow, communication speed, integration, and digital meetings (Axelsson, Melin, & Granath, 2016). According to (Ogonek & Hofmann 2018) digitalisation denotes the ongoing adoption of digital technologies across human and societal activities and its consequences. Closely linked are the concepts of digitisation, which describes converting analogue elements into a digital format, as well as digital transformation, which is seen as an ongoing change process based on digitalisation that impacts the whole organization (Mergel, Edelmann, & Haug, 2019). Similar to the digital transformation, describe practitioners digitalisation as the way to move "from running IT like a business within a business, into a period characterized by deep innovation beyond process optimization, exploitation of a broader universe of digital technology and information, more-integrated business and IT innovation, and a need for much faster and more agile capability" (Gartner, 2014). A recent definition in this context refers to "the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business" (Gartner, 2020).

As we can observe, digitalisation remains a fuzzy concept. It is an ambiguous term that is understood differently by different people, while in the same, it is often used but seldom explicitly defined in the literature. Not only in the scientific discourse but also in practice the term is not clear. Therefore, we see the necessity to investigate to what the term 'digitalisation' in the public sector refers to. Since e-government research can be considered as a 'pracademic' field, i.e. a field that is closely related to the real-world phenomena it is observing (Scholl, 2007), it is important to not only look for definitions of digitalisation in the scientific discourse but also to investigate the understanding of this term in the practice. Investigating both perspectives helps detecting any discrepancy of understandings between theory and practice. Thus, we address the following research questions:

*RQ1. How is digitalisation defined in the academic debate in the e-government field?*

*RQ2. How do practitioners in the public sector define digitalisation?*

The aim of this study is not to come out with a general definition of digitalisation but rather to provide a scope of the understanding of this phenomenon by investigating commonalities and differences between and among the practical and academic reality in defining this term. In order

to achieve this goal and answer the research questions, we conducted a literature review in eight leading e-government journals to identify how the term digitalisation is used and whether and how it is defined. Furthermore, we conducted semi-structured interviews with employees from the public sector to explore definitions from the practice.

Our findings indicate that although the term digitalisation is broadly used in the literature, it is seldom explicitly defined. Practitioners' understanding of digitalisation is diverse. Our results show the need to harmonise relevant terms and contribute to the research stream of e-government by revealing the broad spectrum of understanding that is associated with digitalisation. We identified themes related to digitalisation combining the practical and academic reality and recommend to explicitly define the term 'digitalisation' by conducting research concerning this phenomenon.

Since this study is explorative in its purpose, it presents in the introduction section a broad overview of the use of the term "digitalisation" in the literature, omits the common related work part, and instead conducts an in-depth literature review to provide the state of the art in defining digitalisation in the public sector. The next section will give an overview of our research methods including the literature review and the qualitative interviews. Section 3 present the definitions of digitalisation as derived from the literature whereas section 4 contains the understanding of digitalisation from the interviews. In section 5, we discuss and compare both parts of the findings. Finally, in section 6, we conclude our paper and present implications and the limitations of our study.

## 12.2. Research Methods

The research purpose of this study is to explore the understanding of digitalization in the public sector. As this topic has not yet been investigated in-depth before, we apply an exploratory approach. Exploratory research helps understanding problems, which have not been clearly defined before (Shields & Rangarajan, 2013). Our research design combines insights from two empirical studies: Firstly, we conducted a structured literature review to identify how digitalization is defined in the scientific discourse and secondly, opted for a qualitative interview study to explore how digitalization is understood by employees in the public. Finally, we compared the understanding of digitalization from the qualitative study with the scientific definitions in the existing literature and evaluated the findings.

### 12.2.1. Literature Review

In order to identify definitions of 'digitalization' in the literature, we have conducted a structured literature review. Vom Brocke et al. (2009) argue that the quality of literature reviews is particularly determined by the literature search process. They recommend focusing on review articles potentially higher quality. Thus, we searched for papers in the eight leading journals and major high-quality conference proceedings in the IS and E-GOV area as illustrated in Table 1. Through the journals' websites and scientific databases such as Scopus, we searched the journals for articles containing the terms "digitalization" and "digitization" in their different spellings.

Table 29 Searched Journals and Conference Proceedings

<b>Journal/conference proceeding</b>	<b>Accessibility</b>
Government Information Quarterly (GIQ)	2000-2002; 2018-2019
Information Polity, International Journal of Electronic Government Research (IJEGR)	2005-2018
International Journal of Public Administration in the Digital Age (IJPADA)	2014-2015
Transforming Government: People, Process and Policy (TGPPP)	2007-2019
Electronic Government, an International Journal (EG)	2004-2019
Journal of Information Technology and Politics	
The Electronic Journal of e-Government (EJEG)	2003-2018
EGOV-CeDEM-ePart Proceedings [merge of the IFIP WG 8.5 Electronic Government (EGOV), the IFIP WG 8.5 IFIP Electronic Participation (ePart) and the Proceedings of the Conference for E-Democracy and Open Government Conference (CeDEM)]	2002-2018
Proceedings of the Annual International Conference on Digital Government Research (dg.o)	2000-2018
Proceedings of the Hawaii International Conference on System Sciences (HICSS)	1994-2018

We identified potentially relevant articles based on their title, keywords, abstracts, and on their full-texts. In total, we have identified 251 articles containing one of our search terms. In a second step, these articles were examined to determine whether the terms were merely named or explained. The inclusion criteria in this step were:

- The paper should include any description of what the applied search words refer to, e.g. in brackets.
- The paper should include at least one definition of the applied key terms.

After reading the full text of each article, 39 of the identified articles describe our search terms and only 8 of them reported explicitly on definitions and were included in our review. The rest of the articles were excluded, as they do not meet the inclusion criteria.

### 12.2.2. Qualitative Interviews

*Data collection.* This part of our research entailed a qualitative study using semi-structured interviews. Qualitative research occurs in natural environments and enables to interpret phenomena based on the meanings participants give to them (Alvesson & Sköldbberg, 2018). Interviews were chosen as a method for this step, because they are particularly suited both to uncover the *variety* of interpretations of the term digitalisation among practitioners and to discuss each meaning in-depth with the interviewees. This way, we are able to extract a detailed picture of the reality, without limiting the respondents' answers to predefined categories or definitions.

The data analysed for this article are parts of a larger study<sup>3</sup>, which involved sixteen managers and employees of different public institutions of all administrative levels (federal, state, and local) in Germany. Three interviewees were from the federal level, two from the state level, and 11 from the local level. Where possible, the interviews were conducted personally or otherwise via telephone. The interview guideline consisted of a wide range of topics, covering the interviewees' perceptions of the digital transformation within their organisation, their own attitudes towards digitalisation, their IT skills, but also perceptions of their colleagues' skills and attitudes. The data analysed here focused on the meaning of 'digitalization' for the employees' and managers' everyday work life. Other topics covered in the interviews, such as

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<sup>3</sup> <https://negz.org/wp-content/uploads/2019/09/Berichte-des-NEGZ-02-Digitalisierung-2018-Abstract.pdf>

the managers' role for the success of IT projects or the employees' IT skills, were not used. On average, the interviews lasted 26 minutes. They were recorded and then transcribed.

*Data analysis.* The transcripts were analysed inductively, using the approach to qualitative content analysis as proposed by (Mayring & Fenzl, 2019). First, we extracted definition/s of digitalization from the responses and secondly, examined these responses for similar themes or topics (see results section).

## 12.3. Results

### 12.3.1. Literature Review

In order to get a better understanding of how digitisation/digitalisation is used in scientific publications, we searched eight leading journals in the area of e-government as well as three conference proceedings (s. Table 1).

This search is by no means exhaustive due to partly limited accessibility of journals (i.e. in the case of GIQ). Nevertheless, it offers a first insight into the emergence and use of the term. Digitisation as well as digitalisation are well used concepts in scientific publications. Within our search, the earliest entries date back to the year 1999 for “digitisation” (Information Polity) and 2002 for “digitalisation” (Information Polity and Proceedings of the EGOV-CeDEM-ePart). It is striking that the frequency of use of the term varies considerably depending on the outlet. . Whereas in some outlets the terms appear only hardly or not at all (e.g. EG, d.go), they seem to be an integral part of publications in others ever since (e.g. Proceedings of the EGOV-CeDEM-ePart, EJEG). This also holds true for the choice of the term used, in some outlets there is a more or less equal distribution between ‘digitalisation’ and ‘digitisation’ (EJEG, EGOV-CeDEM-ePart), other outlets exhibit a clear preference for the one or the other. Digitisation is the prevalent term in IJEGR (13 vs. 7 entries) and in IP (28 vs. 10 entries), digitalization is the preferred term in the HICSS (33 vs. 22 entries) and d.go proceedings (3 vs. 0 entries). It is equally interesting to see that – even though partly being present before – the terms seem to have received more importance, as the entries across all outlets significantly increased from 2017 onwards.

It is noteworthy that the term (in either of the two notations) although being present to a certain degree in all outlets is named 256 times, the phenomenon is being outlined in more detail to a much lesser degree. Most often, the term is just mentioned without being described at all. For example, Sundberg and Gidlund (2017, pp. 351-352) just name the term: “They identify three

characteristic themes: reintegration (as opposed to fragmentation), needs-based holism (i.e. reorganization to create seamless, non-stop solutions) and digitization processes (electronic service delivery)” or Zahran et al. (2015, p. 31), who use the term digitization to describe the commonalities of e-government definitions: “A common intersection between different e-Government definitions is the digitization of governmental operations and processes.” When not being defined, most of the mentions refer to the benefits that can be achieved by digitalisation for a better service delivery and citizen satisfaction (e.g., Furuli and Kongsrud (2007), Azmi and Rahman (2015)). Other mentions refer more neutrally to the impact of digitalization (e.g., Griborn and Nylén (2017), Johnson and Roman (2015)). In total, there are only eight mentions where a definition of the term is provided:

Table 30 Results of the Literature Review

Tilson et al. (2010)	Digitization, in contrast, refers to the sociotechnical process of applying such techniques across industries and contexts in ways that affect and shape their underlying infrastructures for the creation, storage, and distribution of content, applications, and services.
Kahre et al. (2017)	Digitalization therefore demands synchronizing IT technologies and resources with digital value propositions, becoming a part of key resources and processes. Another activity is the careful choice and adaptation of disruptive technologies as well as the effective leveraging of IT capabilities.
Busch et al. (2018)	Digitization is the process of converting analog information such as text, pictures, and sound into a digital format. In a public-sector context, digitization typically implies increased use of technologies that can assist street-level bureaucrats in handling cases by providing easy access to information about clients through channels such as online forms, and automating parts of or whole work processes
Meijer (2007)	Digitization of government refers to the use of information and communication technologies (ICTs) by government organizations to execute their business and management processes (Fountain 2001).
Klötzer and Pflaum (2017)	[D]igitalization is understood as “the transformation of socio-technical structures that were previously mediated by non-digital artifacts or relationships into ones that are mediated by digitized artifacts and relationships”. By following this definition, it goes beyond the technical process of encoding analog data or information and of converting it into a digital format, frequently referred to as “digitization”, and emphasizes the utilization of Information and Communication Technology (ICT) by organizations, companies or the society as a whole.
Busch et al. (2018)	Whereas digitization refers to the technical process of encoding practices into technical tools (e.g., CMS), digitalization involves the wider socio-technical system (Yoo, Lyytinen, Thummadi, & Weiss, 2010).
Hofmann and Ogonek (2018)	For the purpose of this paper, we examine the impact of technology integration as a whole and therefore follow the definition by Legner (2017), who introduces digitalisation as ...the manifold sociotechnical phenomena and processes of adopting and using these technologies in broader individual, organizational, and societal context.
Paulín (2018)	digitalization is frequently used to refer to the use of information and communication technologies for business / administration [11], and also the Oxford English Dictionary (OED) defines it in such way (“The adoption or increase in use of digital or computer technology by an organization, industry, country, etc.”); other sources however use it as a synonym for digitization (also Oxford Dictionary of English (ODE) defines it as such), an established technical term referring to the transformation of analogue signals (or real-world items) into a digital representation. [...] Digitalization thus turns into a welcomed tool to demonstrate modernization through technology, without endangering the hegemony of the bureaucracy

	Introducing technology to modernize the way business is conducted.
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Judging on the rich number of mentions in all of the publications, the fact that the majority of research contributions just mentions the terms and refrains from offering a definition is surprising.

### 12.3.2. Qualitative Interviews

Table 31 Results of the interviews

Interviewee	How do the interviewees define <i>digitalisation</i> ?
Interviewee 1 (national ministry for health, consultant)	Increase of electronic transactions, elimination of paper applications or signature requirements, in summary probably something like processing, forwarding, storage of transactions, information in electronic form
Interview 2 (national ministry for health, solicitor)	For me, personally, this [digitalisation] is the conversion of analogue formats into digital signals and, for me, this is clearly connected with the purpose of using, distributing [these formats] and whatever else I can do.
Interview 3 (national ministry for health, solicitor)	[...] the acceleration of written processes in the federal administration, including an increase in the number of processes and a more informal procedure between the various hierarchical levels. In other words, I am dispensing written processes within my organisational unit; they [processes and documents] are now only passed on digitally.
Interview 4 (municipality, case worker for social affairs)	Yes, for me digitalization means moving with the times. In any case, and to get away from paper files, for example in my field, and to move to the e-file, and also to the submission of applications, which can be done online at some point. It also means disseminating information via the Internet, i.e. via digital media, including e-mail or similar. Yes, that is actually what comes to my mind for my area of digitisation.
Interview 5 (municipality, alderman)	Progress, future-oriented, modernisation
Interview 6 (municipality, head of department personnel and organisation)	So, in the best of cases this means that citizens can approach the administration with his or her requests via electronic means, that the process is then carried out electronically, and finally reaches the citizen again in electronic form.
Interview 7 (municipality, project leader document management systems)	Well, to me digitalisation is a term that fits into this time, but that is not recognized by everyone as such. Certainly, a farewell to paper and analogue work.
Interview 8 (state, head of department organisation and collaboration)	It is also possible to simply change or in some cases simply abolish certain procedures that are cumbersome, time-consuming, unpleasant for the employees. [...] For me, digitalization has always made my work easier in the end. Of course, in the beginning it is always associated with change, and change is not something that the human mind particularly likes. Change is always dangerous at first, you know what you know or what you have and the other thing you don't know, you don't know that. But if you get involved – a I have at least had this experience – it actually always has been a positive effect.
Interview 9 (municipality, head of department IT)	Digitisation of course includes, I would say ... in rural areas digitisation is often seen as broadband expansion. That certainly counts too [...] But also administrative digitization is one of my main focuses, i.e. the introduction of D[ocument] M[anagement] S[ystems] and projects in the field of [...] Digitization, as I just mentioned, includes infrastructure expansion in the broadest sense, i.e. infrastructure and broadband expansion in the first place, that's what you often hear in the media

	or from politicians. But first and foremost for me it is to digitally map the existing analogue processes, both within the administration and externally for the citizen.
Interview 10  (municipality, head of department building and housing)	To me, this means a huge progress. Simply because, we digitize all our building applications since, I think 6 years now, which means that if you call us and want to know how the application is coming, you have to give us the reference number and I can give you the information immediately. For us, this is a huge advantage, especially if the colleagues responsible for a certain process are changing, no one has to search for documents, you have all the information you need at the push of a button. The same accounts for situation where you are en route, I can view the documents, we do have this option. [...] I enjoy doing things like this every day.
Interview 11  (state ministry of the interior, coordinator process management)	Digitalisation, as I understand it in the context of my work environment, means to me to meet the client. An I don't mean just providing PDF forms. And not only meeting the client, this also concerns the administration itself. I mean, there are cases where you have an online form and you have to print it out and then, on a third level, someone hacks this information into a system. That's not the goal here. In the end, these are two things that go hand in hand [clients and administrations]. But these things require many resources and a lot of time, because reality is quite different [from the ideal scenario].
Interview 12  (municipality, head of department IT)	Spontaneously I would say that I don't have to deal with paper anymore and above all that I can quickly find the information I have or need. [...] I know there are more aspects to it, but I would give them priority. As a consequence there will be other things, like changing work routines; that the collaboration between departments that we have now will change, but this is not necessarily related to paper [-based processes]. Yeah, and that our work will become more independent from the location you are currently staying at. This brings us to home office and mobile working spaces or offices that do not consist of offices anymore [...]; you may, instead, have share based concepts [...].
Interview 13  (municipality, case worker digitalisation and IT)	It doesn't just mean implementing the current processes only electronically. For me, digitization means thinking again about the complete background, really thinking about everything. For me, a classic example is the topic of exchanging driving licences. In the future, driving licenses will be valid for 15 years. The question that really arises for me today is, with all the technology we have available today, do we really need a driving licence in Europe rather than, I would say, hardware to have something in our hands? Or would there not really be ways of doing this digitally in such a way that I would either have a derived driving licence on my smartphone, as in Great Britain? Or is that even necessary anymore? Couldn't we use different technologies to offer other possibilities to the people who need access to it? So for me, digitalization really means questioning existing things completely.
Interview 14  (municipality, alderman for technical affairs)	For me, this means to make analogue data available, so that they can be processed by the computer. That is the kind of working environment we are familiar with in the technical field and that this data can be made usable again later, when it is needed or processed further. So that is what we have ahead of us as a process. So, analogue to digital, I would say.
Interview 15  (municipality, case worker digitalisation and IT)	Oh, this is a difficult question, because in my understanding the term 'digitalisation' is so broad. But to put that in concrete terms, in our organisation digitization is first and foremost the transition from paper processes to paperless processes. This means that we as a municipality, like most others, are already at a stage where a great deal is already happening without paper, but in a very unstructured, isolated way, without a big plan behind it. Everybody does what he thinks or how he thinks this should be done, and of course there are still many things that could be further digitalized in terms of the replacement of paper, particularly with in-house communication processes. In other words, [digitalization is possible] where we have certain freedoms; in contrast to communication with external stakeholders, where there are also certain specifications regarding written form requirements or even in paper form. But we would be freer regarding in-house processes [..., regarding] the in-house conversion of paper communication to digital, i.e. workflows, whether it is the invoice workflow or internal conversation notes, minutes, all this is still done by us massively on paper. And to start there and to optimize processes ... and to name a second major area, this is more in the area of eGovernment, which means offering citizens, i.e. our customers, to communicate with us in a paperless way or to apply for services, which up to now has been done largely on paper, and to be able to do

	this digitally. So, the citizen portal is a keyword here. And then we have the big issue [...] that normally every municipality should have something like a file plan, in order to ensure that files are complete, that every process in the house is comprehensible, transparent, also for the interdepartmental communication. [...] But like many other municipalities we do not have one, or at least it is not lived intensively. And that's a lot of process management that actually happens. So, you look at the processes, how can they be optimized generally, how can they be further digitized. So, I would name these two the areas as an answer to the question of what I mean by digitization.
Interview 16  (municipality, head of department central services)	[To me, digitalisation means] making processes easier through technological means.

Two aspects stand out when examining the interviews closely. Firstly, there is some variation in the *anchor point* of the individual definitions. For example, some interviewees referred to digitalisation in a rather general manner and did not explicitly focus on the public sector or their daily work routines (interviews 1, 2, 5, 7, 16). In contrast, the other interviewees described digitalisation with regard to the public sector, administrative processes, and the working routines in their respective organisations (interviews 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15). Only one interviewee (9) referred to both a more general understanding and an understanding related to the public sector. Secondly, the analysis also reveals a certain variety in *how* public sector employees and leaders understand digitalisation. Some interviewees defined ‘digitalisation’ in terms of omitting paper-based communication and processes in favour of electronic communication and processes (e.g. interviews 1, 2, 6), whereas others focused more on the consequences of this conversion (e.g. interviews 8, 10, 11). For some interviewees, digitalisation was mostly defined from an internal perspective (e.g. interviews 3, 8, 12), whereas others would also consider the external perspective and would, for example, refer their statements to citizens (e.g. interviews 6, 10, 11). Overall, the analysis of interviews reveals that no common understanding of the term ‘digitalisation’ exists and that it is rather interpreted from an individuals’ experiences than from a shared understanding or behaviour.

## 12.4. Discussion

### 12.4.1. Presentation of Themes from the Literature Review and Interviews

Analysing the literature and the interview quotes, we identified eight different underlying themes of how digitalisation is defined. Six of them, i.e., *transformation of analogue to digital*, *use of ICT*, *consequences and implications*, *vehicle for modernisation*, *process transformation and automation*, and *digitalisation as a process*, were found in both literature and interview

sources. The theme *technical infrastructure* only emerged in the interviews whereas *socio-technical phenomenon* was only mentioned in the literature. Both literature and interview quotes in general cover several themes in one definition of digitalisation. Thus, the emerging themes are not mutually exclusive but rather overlap and influence each other.

*Transformation of analogue to digital.* This theme understands digitalisation as a conversion of previously analogue elements into digital ones. Some definitions from the literature explicitly distinguish between digitisation and digitalisation whereby digitisation is encompassed by digitalisation. It refers to the “technical process of encoding analog data or information and of converting it into a digital format” (Busch et al. 2018). However, also digitalisation is characterised by this transformation, albeit on a different level as it is seen “the transformation of socio-technical structures that were previously mediated by non-digital artifacts or relationships into ones that are mediated by digitized artifacts and relationships” (Klötzer and Pflaum 2017). Many of the interviewees share this view and regard digitalisation as the transformation from analog to digital or the electronically conversion of data or information into digital formats (I2, I7, I8, I9, I15).

*Use of ICT.* Another scheme that is eminent in both literature and interviews associates digitalisation with the use of technology. Sometimes the use of ICT is an end in itself whereas sometimes digitalisation refers to the use of technology *in order to* perform a certain activity. The literature typically specifies the use of the technology. Digitalisation “refers to the use of [ICT] by government organizations” (Meijer 2007), “business/administration” (Paulin 2018) or by “organizations, companies or the society as a whole” (Klötzer and Pflaum 2017). Definitions from the interviews follow this understanding although they often concretise the use ICT in things such as computers or smartphones (I14) and Internet or e-mails (I3).

*Technical infrastructure.* A theme that only emerges in one interview equates digitalisation with the technical infrastructure: “[Digitalisation] in its broadest sense encompasses infrastructure development, i.e., first of all infrastructure and broadband development” (I9). No definitions from the literature refer to such basic technical components as being part of digitalisation.

*Consequences and implications.* Definitions in this theme describe digitalisation by the consequences and implications that arise of the increased use of ICT, rather than focussing on a changing process. These consequences and implications can be neutral without any valuation and refer, for example, to the use of a new application, they can be seen as negative, such as

leading to an increased workload, or they can have a positive connotation and refer to arising advantages such as more flexibility. Definitions from the literature that fall in this category refer to digitalisation as using technology to perform certain business functions such as “execute their business and management processes” (Meijer 2007), “providing easy access to information about clients” (Busch et al. 2018), or “effective leveraging of IT capabilities” (Kahre et al. 2017). Whereas these consequences are described rather neutrally, the interview quotes show more valuation of consequences and implications. Positive consequences are, for example paper-free offices (I7), ubiquitous availability and accessibility of data and information (I8) or mobile working (I8). Also, explicitly positive connotated understandings can be found: “[digitalisation means] that I can better use, edit, distribute and what-so-ever the whole thing” (I2). In contrast, negative consequences are also mentioned such as “an increase in cases” (I3).

*Vehicle for modernisation.* In this theme, digitalisation is understood as modernity or a sign of modernity. While, on the one hand, digitalisation might mean using technology in order to improve outdated structures and processes, on the other hand, it can also be an intangible concept that embodies or evokes a feeling of modernisation and modernity. In the literature, digitalisation is “a welcomed tool to demonstrate modernization through technology, [...] introducing technology to modernize the way business is conducted” (Paulin 2018). In contrast, in the interviews, digitalisation is a fuzzier concept and equates to “progress, forward-looking, modernisation” (I5), “a term that meanwhile fits into this time” (I5) and “to me personally, great progress” (I10).

*Process transformation and automation.* Definitions that belong to this scheme understand digitalisation as transformation and automation of processes. This can refer to internal changes in the government processes, to external changes such as on the citizens’ side, as well as to comprehensive changes that affect a process chain or the society as a whole. Literature, for example, sees digitalisation as “automating parts of or whole work processes” (Busch et al. 2018) or affecting and shaping the processes’ underlying infrastructures (Tilson et al. 2010). Similarly, according to the interviewees “it means something like electronically processing, redirecting, and storing processes and information.” (I1), “process management and process optimisation” (I6). In addition to this internal perspective, also the service delivery for citizens (I6) is considered as well as far reaching transformation that goes beyond the mere technical change: “digitalisation means to me to reconsider the whole background, actually everything” (I14).

*Digitalisation as a process.* Unlike the previous theme where digitalisation induces changes in operational processes, this theme acknowledges that digitalisation is an ongoing process in itself, i.e. a matter that will not come to an end. In the literature, for example, digitalisation is seen as “phenomena and processes of adopting and using these technologies” (Hofmann and Ogonek 2018). Some interviews agree with this understanding and associate digitalisation with recurring aspects (I12) as well as with “[the thing] that in its totality we are having in front of us a process” (I14).

*Sociotechnical phenomena.* In this theme, digitalisation is seen as a phenomenon that goes beyond the purely technical aspect and acknowledges the social side as well as the interplay between social and technical elements. This understanding is only taken up by the literature that sees digitalisation as a “sociotechnical process” (Tilson 2010), “the manifold sociotechnical phenomena and processes” (Hofmann and Ogonek 2018) and the involvement of “the wider socio-technical system” (Busch et al. 2018).

Table 32 Comparison of Results

	Literature Review	Interviews
Transformation of analogue to digital	(Busch et al. 2018), (Paulin 2018), (Klötzer and Pflaum 2017)	I2, I7, I8, I9, I15
Use of ICT	(Meijer 2007), (Klötzer and Pflaum 2017), (Paulin 2018)	I3, I14, I16
Technical infrastructure	No equivalent	I9
Consequences and implications	(Tilson et al. 2010), (Busch et al. 2018), (Meijer 2007), (Kahre et al. 2017)	I1, I2, I3, I7, I8, I10, I16
Vehicle for modernisation	(Paulin 2018);	I5, I7, I10
Process transformation and automation	(Busch et al. 2018), (Tilson et al. 2010)	I1, I6, I11, I14, I16
Digitalisation as a process	(Hofmann and Ogonek 2018)	I4, I12, I14
Sociotechnical phenomena	(Tilson 2010), (Hofmann and Ogonek 2018), (Busch et al. 2018)	No equivalent

#### 12.4.2. Comparison of Literature Review & Interviews

First of all, it is striking that out of the ten outlets that we searched in, only 7 articles explicitly define digitalisation. This might imply that digitalisation is perceived as a well-known concept that does not require an explicit definition because its meaning is universally understood. However, our analysis indicates that while the term digitalisation might be well used, its understanding and associations are far from being uniform. A similar picture emerged during

the interviews that we conducted. While the term digitalisation was known to all interviewees, some of them struggled with defining it and had no clear idea in mind. The interviewees' understanding was apparently based on experiences rather than on explicit knowledge.

Our results show that there is no unified definition of digitalisation. Instead, both in the literature and in the interviews, definitions of digitalisation contain different themes whereby one definition can contain several of these themes. They range from concrete aspects such as the use of ICT to blurry conceptions such as digitalisation being a vehicle for modernisation.

Referring to how digitalisation is defined in the academic debate in the e-government field (RQ1), we identified seven themes. These are *transformation of analogue to digital*, *use of ICT*, *consequences and implications*, *vehicle for modernisation*, *process transformation and automation*, *digitalisation as a process* and *socio-technical phenomenon*. Practitioners in the public sector (RQ2) define digitalisation in a similar way and agree with the first six themes. While in our study, they did not mention digitalisation as *socio-technical phenomenon*, they instead brought up the perspective of digitalisation as *technical infrastructure*. The results indicate the wide variety of what people – practitioners and researchers - understand by digitalisation, and the different perspectives and foci by defining this phenomenon.

From a broader perspective, the strong overlap between the two worlds is salient, which shows that similar aspects of understanding exist in the academic and practitioner debate. However, it is striking that the theme of digitalisation as a socio-technical phenomenon is only taken up by the literature. While it is often argued in the general Information Systems literature that the socio-technical aspect is one of the main characteristics of digitalisation, this aspect is not seen by the interviewed practitioners. In contrast, the inclusion of digitalisation as the technical infrastructure indicates that the practitioners' point of view might be more hands on.

From a narrower perspective, however, we see that even within both sectors, the understanding of digitalisation varies considerably with seven different themes being used both in research and in practice. The bandwidth of these different themes differs quite strongly in their content and dimension. While some, for example, focus on the negative consequences, others perceive digitalisation as a vehicle for modernisation. These different foci can indicate why people react differently when it comes to talking about digitalisation.

## 12.5. Conclusion & Outlook

The aim of this study was to analyse how researchers and practitioners in the e-government domain define the term digitalisation. Our results indicate that there is no unified understanding of digitalisation neither in practice nor in research. Instead, we identified eight different themes according to which definitions of digitalisation can be categorised. Six of them *transformation of analogue to digital*, *use of ICT*, *consequences and implications*, *vehicle for modernisation*, *process transformation and automation*, and *digitalisation as a process*, were found in both literature and interview sources. The theme *technical infrastructure* only emerged in the interviews whereas *socio-technical phenomenon* was only mentioned in the literature. This plethora of themes shows that although the term digitalisation is widely used, it is far away from being a uniform concept. Instead, it covers a broad bandwidth of themes that range from rather technical to more conceptual aspects.

Our results have several implications for both research and practice. Especially for researchers, it is important to make concrete what they understand by digitalisation when they conduct research in this field. On the one hand, this is crucial because academic research builds on the previous body of knowledge and it should become clear that it refers to the same phenomena. On the other hand, when conducting empirical work, especially generating data in cooperation with practitioners, it is important to clarify the concepts under investigation. Our analysis reveals that especially the understanding of digitalisation as a socio-technical phenomenon mainly prevails in the academic discourse but is not shared by practitioners.

From a practical point of view, similar implications hold. Likewise, it is important to specify which aspects of digitalisation are actually meant. As indicated by our findings, some people associate digitalisation with positive attributes such as modernisation while for others, negative connotations such as increase in work processes predominate, which can lead to conflicting situations especially between managers and their employees. Also, politicians who accentuate the advantages of digitalisation should be aware that parts of the population might not share their understanding of this phenomenon.

We do not argue for the need to develop yet another definition of digitalisation as both researchers and practice have already proposed several definitions of this term. Neither do we consider it a problem that people use definitions of digitalisation that deviate from one another. However, we strongly argue for the need to specify what digitalisation means to each of us if we exchange ideas with others.

It is important to mention that our research has several limitations. First of all, due to the limitation of journals and conferences that we analysed, there might be themes of digitalisation that we did not identify. The eight themes should therefore be seen as a living set that should constantly be extended. The same limitations apply to our interviews. Conducting more than 16 interviews might have revealed further definitions of digitalisation. Second, while our literature review has been based on internationally published articles, our interview study took place in Germany, thus containing a potential cultural bias. Finally, we only focused on the term ‘digitalisation’, leaving out related concepts such as digital transformation.

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