

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

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ABSTRACT

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 Centered 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.

KEYWORDS

Contextual Design, Ethnography, Government, Human Centered Design, Human Resource Management, Involvement, Lead Users, Literature Review, Participatory Design, Software Development, User Involvement

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 the 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

DOI: 10.4018/IJPADA.2019040102

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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, 2013). 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, Jørgensen, & Krogstie, 2004; Horton, 2003; 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, Krogstie, Oppermann, & Svanaes, 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.

THEORETICAL BACKGROUND

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, & 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.

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).

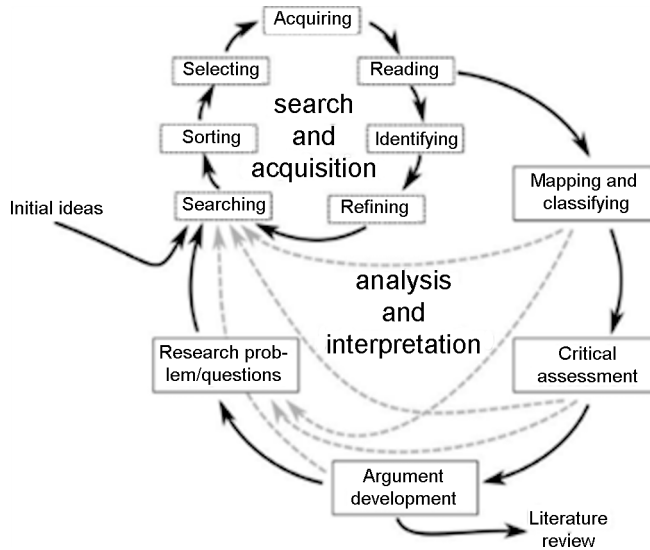
RESEARCH METHODOLOGY

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 1, 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-

Figure 1. A hermeneutic framework for the literature review process consisting of two major hermeneutic circles (Boell & Cecez-Kecmanovic, 2014, p. 264)



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.

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.

For the search process combinations of the four categories mentioned in Table 1 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)}}

Table 1. 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

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.

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.

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 or provide an overview of practices for participation and used methods for user participation in each of the identified approaches.

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, Holgersson, Söderström, & Hedström, 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.

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.

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).

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.

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).

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 Looise (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 2 illustrates the typically used methods for participation in each of the identified approaches.

Table 2. Overview of participation in the identified approaches

Practices of Participation	Typical Methods Used
PD	
<ul style="list-style-type: none"> • As advisors in specific design decisions • Assess prototypes developed by the system developers • As representatives in the form of selected small group of users who make design decisions • As members in project work groups and steering committees • 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 	<ul style="list-style-type: none"> • Workshops, prototyping, visit of other work sites, courses, lectures, supervised project work, questionnaire, and interviews.
HCD and UCD	
<ul style="list-style-type: none"> • As advisors or representatives • In meetings with key stakeholders for usability planning and scoping • By task requirements • By iteration of design solutions • In multidisciplinary design teams • By understanding and specifying the context of use • By specifying the requirements • For the evaluation of the design against the requirements 	<ul style="list-style-type: none"> • 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
Ethnography	
<ul style="list-style-type: none"> • By developing shared views on the work • By requirement elicitation • By system design 	<ul style="list-style-type: none"> • Observation, interview and video analysis. Open-ended (contextual) interviews and (participant) observations, audio or video recordings
Contextual Design	
<ul style="list-style-type: none"> • By early design activities • By optimizing work processes • By providing input to the product definition process 	<ul style="list-style-type: none"> • Contextual inquiry such as observation and interview together, “MUST” method, field studies of work in combination with case-based prototyping
UI or Lead Users	
<ul style="list-style-type: none"> • By providing new ideas • By identifying problems and design solutions • As responsible for problems and solutions • By collaborating with developers 	<ul style="list-style-type: none"> • Initiation of the development of new products, improvement of existing products
HRM	
<ul style="list-style-type: none"> • By participative decision-making as source of power • By communication and knowledge transfer to coordinate and cooperate within the organization 	<ul style="list-style-type: none"> • Explicitly define job tasks, analyze training needs, provide adequate user training, and motivate potential users by establishing reward systems

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 (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 (Wirick, 2009). Deliverables are documents that can include a project plan, training manuals (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.

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 (Damanpour & Schneider, 2006). 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.

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.

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.

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.

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 3 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.

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

Table 3. Opportunities for participation across the project life cycle in the public sector

Activities	Opportunities for Participation
Participation in the Initiation and Planning Phase	
<ul style="list-style-type: none"> • Identifying of business needs • Identifying of stake-holders • Development of a project concept • Including costs and risks analysis • Planning of required resources and activities • Building project teams 	<ul style="list-style-type: none"> • Lead users can initiate project initiatives by providing new ideas for the development of new products or improvement of existing products • 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 • Employee information about the initiation of the project via e-mails, information on internal webpages, newsletter, or arranged workshops
Participation in the Requirements Definition and Sourcing Phase	
<ul style="list-style-type: none"> • Elicitation of user requirements (requirements gathering and requirements analysis) • Development of user-training plans or concepts • Procurement procedures • Request for proposals • Vendor evaluation and selection • Contract documents/agreements 	<ul style="list-style-type: none"> • In activities for analysis of needs and possibilities and for formulating system requirements • Provide information about the characteristics of the users, their tasks and their operating environment for requirement gathering • Provide input to the product definition process • As interview partner, member of focus groups, or for further methods within contextual design or ethnography • 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 • Reviewing of the deliverables such as the requirement specification document and training manuals • User representatives such as employees with adequate skills and work councils participate by inspecting the proposals and contract documents and selecting the vendors
Participation in the Design and Development Phase	
<ul style="list-style-type: none"> • The application system is designed and developed according to the requirement specification • The developed system is tested in a separate test environment 	<ul style="list-style-type: none"> • Assess prototypes, early feedback about the design, the functionality as well as the usability of the system • 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
Participation in the Deployment and Operation-Test Phase	
<ul style="list-style-type: none"> • The system is integrated in a pilot production environment • Tests in a real environment with real users • Evaluating the system based on the defined requirements 	<ul style="list-style-type: none"> • 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 • Employees can participate in training activities and evaluate the training concept for eventual concept improvement
Participation in the Operation and Maintenance Phase	
<ul style="list-style-type: none"> • Rollout of the system • Ongoing system operation • Monitoring and evaluation of the system • Installation of system modifications (updates/releases) • Maintenance of the system 	<ul style="list-style-type: none"> • 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 • Support during the system use (for any questions about the implemented system or help needed) • Knowledge sharing through communication

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 projects 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 this 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.

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