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Research paper

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Abstract

Digitization offers employees the opportunity to take part in the innovation development processes within organizations. Although employees' integration as innovators offers promising opportunities, the topic has been fairly neglected both in research and practice. Organizations could take a step in this direction by following examples such as Google's 'Innovation Time Off', where employees are temporarily released from their ordinary work to generate new ideas. Although organizations of various backgrounds should be able to reap benefits of such work models, implementation might fail due to an organizational culture built on hierarchical structures and rigid processes. Especially in public organizations, little is known about the successful implementations of such work models. In particular, research on drivers and barriers of such work models is scarce. Using the socio-technical systems model as a guiding lens, our case study shows that implementation success in public organizations increases with the existence of four aspects: 1) innovation time to foster innovative mind-sets, 2) innovation champions who move beyond the confines of their assigned work, 3) a digital innovation platform enabling an internal crowdsourcing community, 4) an innovation culture leading to beneficial changes in organizational structure.

Keywords: case study, digitized innovation process, employee-driven innovation, public organization, STS model, work model.

1 Introduction

Most organizations consider innovation a key imperative. The digital transformation has given rise to a new type of innovation and influences not only private but also public organizations (Janowski, 2015). Organizations increasingly recognize that innovation does not just happen exclusively through top-down decisions internally by investing in research and development (R&D) departments or externally by pursuing open innovation or creating innovation hubs (Birkinshaw and Duke, 2013). Rather, a bottom-up approach entailing continuous innovation powered by employees' insights and ideas could provide great value to organizations that want to be at the forefront of innovation (Nightingale, 2008; Benbya and Leidner, 2016).

A bottom-up approach leads to a wide range of outcomes from new services and products to new business models and new ways of working (Gawke et al., 2017). A prominent example for such a new way of working is Google, which established an 'Innovation Time Off'(or briefly innovation time) where software engineers are allowed to use up to 20 percent of their time to work on organization-related topics of personal interest (Nightingale, 2008). But solely offering *innovation time* is not the silver bullet to foster employee-driven innovation. Instead it requires a broader organizational change that not only transforms employees' minds but also the underlying organizational processes and infrastructure (Birkinshaw and Duke, 2013). The implementation of a *work model* that combines innovation time with digital technology might offer organizations the chance to increase employees' involvement in the innovation process, because digital technology allows for new forms of organizing innovation, e.g., by enabling innovation collectives based on a broad variety of actors across an organization (Fichman et al., 2014; Nambisan et al., 2017). Organiza-

tions can, for instance, establish *digital innovation platforms* as part of a work model. These enable employees' collaboration on innovative ideas by offering different features, such as virtual voice and text collaboration (e.g., Skype) as well as project documentation possibilities (Benbya and Leidner, 2017; Soukhoroukova et al., 2012). Thus, work models can alter organizational innovation processes and therefore have the potential to enhance organizations' collective innovation capability.

However, researchers and managers have only gradually directed their attention towards the inherent opportunities of employee-driven bottom-up generation of innovation enabled by the implementation of such work models (Gawke et al., 2017; Nijhof et al., 2002). This is even less the case for work models' implementation in public organizations as those organizations build upon hierarchical structures and rigid processes (Nevo and Wade, 2010; Erickson et al., 2012). Work on employee-driven bottom-up generation of innovation is scarce in the Information Systems (IS) field and public sector research (Nijhof et al., 2002; Tirabeni et al., 2016; Erickson et al., 2012). Moreover, not much is known about how the environment of public organizations needs to be shaped to promote employees' involvement (Nevo and Wade 2010) in a work model that exploits the potentials of digital technology for innovation development (henceforth referred to as digitized innovation development) (Erickson et al., 2012). To benefit from the potential of employee-driven innovation it is particularly vital to generate knowledge on a work model's influencing factors in the organizational environment. Thus, we aim to answer the following research question: *What are drivers and barriers of the implementation of a work model enabling employee-driven innovation?*

We approach this research question by conducting an interpretative case study on the implementation of a work model enabling employee-driven innovation at an IT service provider operating in the public sector. The work model encompasses two pillars; the allocation of innovation time within the scope of employees' regular working hours and the implementation of a digital innovation platform to create a work environment benefitting digitized innovation development. We explore how such a work model can be implemented in a public organization, characterized by an organisational environment adverse to innovation.

Public organizations are built on hierarchical structures and rigid processes and mostly lack any type of innovation culture. Yet, organizational culture can significantly influence the adoption and usage of new Information Systems (Besson and Rowe, 2012; Nevo and Wade, 2010). If the values represented by new Information System are in discrepancy with organizational values, users will be hesitant to or even resist the IS adoption (Leidner and Kayworth, 2006; Cooper, 1994). This collision of values might be particularly evident when it comes to broad employee involvement in innovation development (Wagenknecht et al., 2017; Zuchowski et al., 2016). Whereas the implementation of work models has been successful in private organization, introducing work models to public organizations might encounter resistance due to their distinct culture and their highly hierarchical structures (Riemer et al., 2015; Tyworth, 2014).

This paper provides a systematic investigation of a change in an organization's innovation development strategy including the related changes for employees, technological systems, and the organizational structure. Thus, we analyze our results using the socio-technical systems (STS) model (Leavitt, 1964; Lyytinen et al., 1998) as a guiding lens. We carve out influencing factors strengthening or inhibiting a work model for employee-driven innovation and offer a deeper understanding of drivers and barriers of its implementation for digitized innovation development. Besides, we identify the essential role of innovation champions for digitized innovation development in public organizations and outline how they influence a part of the actor component all other components and corresponding interdependencies of the STS model.

The structure of this paper is as follows. First, we provide the research background of our study by describing the current state of research relevant for work models' implementation. Then, we outline the methodology of our case study. Next, we delineate our results building on the STS model and analyze the influencing organization- and technology-enabled drivers and barriers for digitized innovation development. Finally, we discuss our findings and their implications for future research and practice.

2 Research Background

Innovation Development on Digital Platforms. Digital technology has transformed the nature and the development of new products and services fundamentally (Nambisan et al., 2017; Fichman et al., 2014). Based on Nambisan et al. (2017), we conceptualize digitized innovation development as the process of creating and consequently changing IS-supported business systems or models by using digital technology. The newly arising availability of digital platforms and open standards has facilitated collaborative innovation

projects among individuals inside a community (e.g., Bresnahan and Greenstein, 2014; Gawer and Cusumano, 2014; Parker et al., 2016; Tiwana et al., 2010).

Over the last years, user-driven innovation (Von Hippel, 1995, 2005) and open innovation (Chesbrough, 2003), instances of idea generation on digital platforms founded on knowledge input from external sources, have received significant attention (e.g., Kallinikos et al., 2013; Lyytinen et al., 2016; Nambisan, 2013). However, most of this research is based on innovation developed externally (e.g., innovation hubs, open innovation) or internally in R&D departments of private organizations. In contrast, the phenomenon of employee-driven innovation on digital platforms has mostly been disregarded up to this point, as IS researchers have given comparatively little attention to how the increasing availability and use of digital technologies and work-infrastructure affect digitized innovation development (Fichman et al., 2014). Existing research either lacks the theoretical basis, or primarily observes design elements and focuses on specific minor aspects of the designed artifact (e.g., Westerski et al., 2013; Benbya and Leidner, 2016, 2017). To overcome these shortcomings, several IS scholars have called for research and more attention to IT-enabled transformations in organizational work models (Fichman et al., 2014; Lucas et al., 2013).

Innovation Time for Employee-Driven Innovation. Since the creative skills and problem-solving abilities necessary for innovation development could basically be possessed by every employee, organizations are introducing new practices to benefit from the innovation potential of their employees' ideas, skills, and knowledge. From the suggestion box to idea management systems employees are encouraged to contribute to innovations by submitting innovative suggestions for the improvement of organizational methods, products, and systems (Sandstrom and Bjork, 2010). Visionary organizations take the notion of idea suggestion systems one step further by either allocating a significant amount of working time for employees to develop and present their own ideas or by offering a space within the ordinary work structure for creative activities on organization-related topics (Birkinshaw and Duke, 2013; Nijhof et al., 2002). These approaches are associated with the buzzwords ‘time out’, ‘slack time’, or ‘creativity time’. For example, Google branded ‘Innovation Time Off’, whereby its software engineers are allowed to use up to 20 percent of their time on organization-related innovation projects of their own interest (Nightingale, 2008). Interestingly, only practitioner-oriented articles have covered and addressed these approaches of innovation time so far (Soliman and Spooner, 2000; Birkinshaw and Duke, 2013; Nijhof et al., 2002).

Organizational Culture. Organizational culture can be defined as a set of shared expectations and common understanding about an organization’s functioning, summarized as a complex system of values and norms (Ke and Wei, 2008; Schein, 1985). Culture influences employees’ perception and behavior (Schein, 1985), determines how social groups interact with IT (Leidner and Kayworth, 2006), and hence, has a significant influence on the IS implementation process (e.g., Jackson, 2011; Leidner and Kayworth, 2006). Furthermore, research on IS-enabled organizational change have frequently emphasized that organizational culture can significantly influence the adoption and usage of new information systems (i.e., digital innovation platforms) (Besson and Rowe, 2012; Nevo and Wade, 2010). If there is a discrepancy between the organization’s cultural norms and the system’s values, implementation of new IS fail (Cooper, 1994; Leidner and Kayworth, 2006). In this case, new systems remain unused, users will be hesitant, and might even resist using and adopting it (e.g., Tyworth 2014). Thus, in organizations with varying in culture, the same information system can harvest diverse effects depending on the explicit context of the organization (Leidner and Kayworth, 2006). Therefore, it is possible that work models, which have been shown to be successful in organizations like Google, might encounter resistance in public organizations.

To overcome the previously mentioned challenge, our research aims to explore the drivers and barriers of the implementation of a work model enabling employee-driven innovation in public organization, which are characterized by a lack of innovation culture, highly hierarchical structures, and rigid processes. Herby, our study demonstrates how a *work model* including *innovation time* and a *digital innovation platform* can be implemented in public organizations.

3 Research Methodology

We use an interpretative case study design (Walsham, 1995) to describe and analyse the organization- and technology-enabled drivers and barriers to implementing a work model for employee-driven innovation in the public organization. Since qualitative case studies use a research strategy which focuses on understanding the dynamics present within individual settings, this methodological approach fits well with our research setting (Gephart, 2004). We therefore accompanied the implementation of a new work model for a period of two years to examine the influencing factors of its implementation.

To illuminate the implementation of the new work model comprehensively, our period of observation starts before its formal introduction. Further, we accompanied a group of employees in their endeavour to create innovation within the new work system from their initial to their regular use of innovation time and the digital innovation platform. In doing so, we went beyond typical case studies on innovation development, which solely consider innovation from the perspective of the respective innovation department.

Our case study was conducted within the public sector. The public organization we studied is a large IT service provider for a conglomerate of public financial institutions. It provides a full range of IT services, including the development and implementation of IT solutions, networks and technical infrastructure as well as the consulting, training and support. The organization employs almost 5,000 people across three locations, handles nearly 90 billion financial transactions, and is responsible for servicing 125 million accounts on average.

3.1 The Work Model for Employee-Driven Innovation

In 2015 the organization introduced a new work model to foster employee-driven innovation in a cross-divisional department (with 88 employees). This work model consists of two pillars, a temporal (the 5/95 percent ratio for innovation time) and a technological component (the digital innovation platform called 'Brainstation'). Thereby, all employees were encouraged to apply 5 percent of their weekly working time to the generation of new or the extension of already existing ideas on a digital innovation platform. The digital innovation platform's functionality comprises ideas' collection and evaluation, and enables the collaboration of a broad variety of actors in innovation collectives. The basic concept of this model is that ideas leading to an innovation come from current employees, whose formal job description does not necessarily involve the creation of innovation. In doing so, the application of such a work model is more strongly concentrated on incremental (e.g., organization's processes) than on radical innovation development (e.g., new products and services). Consequently, the work model aims at (1) advancing the organization's digitized innovation development processes for employee-driven innovation and (2) developing incremental innovation ideas per se.

The contributor of an innovative idea applies for the exemption from daily work time for up to two hours per week (5% of weekly work time) to develop innovations through the digital innovation platform. After the confirmation through the direct supervisor, the contributor can develop and implement the idea either alone or communal as part of a team. The participation in this work model is voluntary. A requirement of participation in the process is the continuous and complete documentation of all steps and activities on the digital innovation platform, which is freely accessible to all employees and thereby supports the monitoring of every innovation project. This approach is based on the idea of building an internal crowdsourcing community, where every employee can provide her input regarding a new innovation idea. A further hallmark was added in 2016. After an only modest participation rate in the beginning, a reward system based on the results of employees' interviews was included. The system aims at further incentivizing employees to develop innovation within the work model.

To understand the research setting, we provide some statistics on usage data extracted from the platform's log files. At the end of 2017 the platform had 75 users, who had registered for the work model and who had initiated twenty-eight unique innovation ideas on various issues (e.g., development of commute-sharing app). Nine innovation ideas had been implemented successful, while four were not feasible and were consequently not developed further.

3.2 Data Collection and Analysis

We used multiple methods to gather data in this case study (see Table 2). We conducted semi-structured interviews, as commonly used in IS research (Myers and Newman, 2007). To obtain a deeper understanding of factors influencing the implementation of the new work model, we conducted these interviews with experts and regularly employees. The experts are characterized by being part of the developer team and/or actively contributed to the implementation of the digitized innovation platform, whereas regularly employees did not participate in the launch. For the purpose of attaining a certain level of generalizability (Lee, 1989), two interviews with each expert and employee were conducted during the observation period. In the first round of interviews in 2015 we asked five experts and 22 employees to evaluate the launch and implementation of the new work model. The second round of interviews in the beginning of 2017 focused on lessons learned as well as influencing factors in implementing the work model. Two researchers interviewed each expert for a time period of 50-80 minutes. During the interviews, we asked the interviewees explicit about technology and organization-enabled driver and barriers and could so collect unambiguous

statements. Further, we invited participants to provide anecdotes, examples and further details on the topics of interest, which were then coded following the researched drivers and barriers for the implementation of digitized innovation development. In total, we conducted 54 interviews with 27 employees from various levels and units throughout the public organization. We interviewed 19 men and 8 women. The average interviewee was 40 years old and had 16 years of professional experience. Table 1 presents the demographic characteristics of the interviewees.

Gender		**Age**		**Highest level of education**		**Job tenure (in years)**	
Male	70.3%	< 20	0%	Less than high school degree	0%	< 9	29.7%
Female	29.7%	20-29	25.9%	High school degree or similar	18.5%	10-19	25.9%
		30-39	14.8%	Bachelor degree or similar	40.7%	20-29	40.7%
		40-49	37.0%	Master degree or similar	37.1%	30-39	3.7%
		50-59	22.3%	Doctorate degree	3.7%	> 40	0

Table 1. Demographic characteristics of interviewees

In addition to the interviews, over a period of 18 months we participated in the biweekly virtual meetings of a group of employees, which were working on an employee-driven innovation project as part of the new work model. The team consisted of five employees with different professional backgrounds from various departments and organization locations. At least two and up to a maximum of four researchers participated in each regular session. During the biweekly meetings, lasting from half an hour to two hours, we regularly received a status update of the innovation project and employees' use of the new work model for developing innovations.

Type of data	**Topics covered**
Interviews	• Launch and implementation of the new work model • Usage rate of the new work model • Effects of the implementation of the new work model for employees, department leaders and the organization as a whole • Lessons learned about standardizing digitized innovation processes • Lessons learned about implementing a reward system • Motivational changes among employees • Influencing factors (drivers and barriers) of the new work model • Benefits and weaknesses of the new work model
Records of regular meetings	• Cooperation and collaboration between team members • Coordination and problem-solving approach by team leader • Innovation project progress • Changes in team structure due to recruitment and selection of team members
Project descriptions	• Status updates of innovation projects and their progress
Idea technical descriptions	• Status and progress of innovation projects
Email correspondences	• Employee's communication within a team

Table 2. Overview of case study's data sources.

For the purpose of attaining a high internal validity of the study and to establish trustworthiness and credibility, we used multiple sources of data (data triangulation) (Stake, 1995). Thus, we collected additional documents such as meeting records, project descriptions, submitted idea sketches and technical descriptions as well as email correspondences. These additional secondary data sources complemented our analysis.

We analysed our data by first transcribing and coding all field notes and records of regular meetings and interviews. The content of all of these materials was analysed using the key components embodied in STS model (see section 3.3). To increase internal validity (Morse et al., 2002), two researchers coded all transcripts. Following their own perception and with the help of qualitative data analysis software Nvivo Pro 11 (a qualitative data analysis software package developed by QSR International) the researchers analysed the statements line-by-line and assigned passages in each interview to codes that modelled the topics covered by the interviewees. The researchers extensively and frequently discussed their coding results and revised the coding categories in six feedback loops. The entire coding process yielded a total of 123 coded quotes. Inter-coder agreement between the two coding researchers was around 88 percent, making it necessary to discuss and resolve discrepancies in 14 codes. The resulting coding scheme formed the basis for the results presented in this paper.

3.3 Socio-Technical System as Guiding Lens

To systematically capture and analyze the influencing factors associated with the introduction of a new work model, we chose the socio-technical system model (STS) (Lyytinen et al., 1998; Lyytinen and Newman, 2008) based on Leavitt's diamond (Leavitt, 1965) as a guiding lens. The STS model portrays the complex interactions between people, technology, and organizational factors. By drawing on the STS model we were able to examine the work model as a system of four interacting components: actors, technology,

task and structure. These components can easily be translated into the elements used within the new work model: *actors* cover all stakeholders including end-users or managers; *technology* covers the development tools and methods, as well as hardware and the platform; *task* signifies expected outcome in terms of goals and deliverables; and *structure* denotes the organization and other prevailing organizational arrangements.

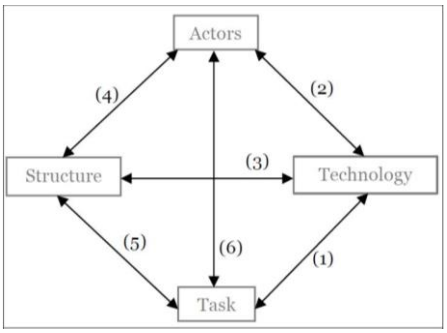

Figure 1. STS Model (adopted from Lyytinen et al. 1998).

While each of the four components individually provides a valuable understanding of drivers and barriers, the relations dealing with interdependences between all components deliver more important insights for our analysis (see Figure 1): 1) *Technology-task interdependencies* clarify the fit between technologies and task, and describe risks arising due to misfits between both components. 2) *Technology-Actors interdependencies* address risks and benefits created by matching people with technology, or by introducing untried technologies. 3) *Technology-structure interdependencies* deal with the effect of technological choices on workflows, systems of authority and communication lines. 4) *Actors-structure interdependencies* focus on interactions between structure and actors. Typical objects are incentive schemes and sanctions, values and beliefs, and the degree of conformation among actors' behaviors and prevailing organizational structure. 5) *Task-structure interdependencies* describe the relation between organization and development task, as well as risks accompanying a misfit between structure and task. 6) *Task-actors interdependencies* focus on the actors' abilities and shortcomings in specifying, analyzing and achieving a task as well as employees' task prioritization. The STS model has frequently been applied by IS researchers and has proved itself to be useful in understanding drivers and barriers for the process of organizational change (e.g., Mumford, 1983; Kwon and Zmud, 1987; Lyytinen and Newman, 2008).

4 Results

Based on the case study and the data analysis described in the previous section, we analyzed the new work model using the STS model (Leavitt, 1965; Lyytinen et al., 1998) as a guiding lens. Before describing the identified drivers and barriers for all interdependencies, we define the scope of each component of STS in the context of our case study. The *actors* component covers the modeling of all relevant individuals of and in the work system (i.e., users, managers and platform designers). The *structure* component comprises the design of communication and workflow (e.g., institutional arrangements, hierarchies). The *technology* component consists of all modeled tools, such as software and hardware (i.e., digital innovation platform including all new features and functionalities, intranet). The *task* component incorporates the design of goals, purposes or deliverables (e.g., innovation mindset).

We investigated the six interdependencies (see Figure 1) between task, structure, technology, and actors fostering and/or hindering employee-driven innovation on a digital innovation platform in the new work model. In the following we discuss all interdependencies related to technology within subsection 4.1 and the remaining interdependencies related to actors, structure and task within subsection 4.2.

4.1 Technology-Enabled Drivers and Barriers

Connected to technology and equipment a number of factors unfolded as technology-enabled drivers and barriers in implementing digitized innovation development in the new work model. First, we address the drivers and barriers with respect to *technology-actors* interdependencies. We observed that the availability of an intranet to incorporate the digital innovation platform represented a major *driver* for digitized innovation development in the organization. Before the launch of the new work model, the public organisation had already used an intranet website for the collaborative editing of content relevant to a number of employees. The available functionalities of the intranet facilitated and accelerated the implementation of a digital innovation platform. In a short period of time, the organization's software developers were able to

develop the digital innovation platform, test a prototype and implement a final version. A software developer explained, '*The platform was built very fast.[…]We were able to extend the existing structure and create some new features*'. At the same time, the incorporation of the digital innovation platform into the existing intranet also lowered entry barriers. Since employees already knew the basic structure and features of the intranet, they quickly started to use the platform.

Nevertheless, other framework conditions, such as the low acceptance and usage rate of the intranet among employees formed *barriers* to digitized innovation development in the work model. Since the public organization had predominantly used the intranet to communicate topics aimed at specific employee groups, prior usage of the intranet fluctuated sharply among employees. As the digital innovation platform served two purposes, processing interesting ideas for innovation and managing the subsequent projects, the low user acceptance rate among some employees caused a significant number of employees to be cut off from internal innovation projects.

Second, we address the drivers and barriers with respect to *technology-structure* interdependencies. Based on the analysis of our interview data, we observed the following *drivers* with respect to technology-structure interdependencies: The implementation of the digital innovation platform led to a standardization of the idea submission process. Accordingly, the collaboration in employee-driven innovation projects could proceed efficiently (as illustrated by the statistics extracted from platform's log files in section 3.1), since every employee followed the same procedure (determined by the platform's setup) when submitting and working on an innovation idea. Furthermore, new functionalities incorporated in the platform, such as internal chat programs, also acted as drivers for digitized innovation development as they allowed the coordination of digitized innovation projects across different departments and locations. One of the software developers explained the new features, '*We integrated existing video conferencing systems and screen-sharing tools in the platform. We also extended the possibility for cross-department collaboration and communication in the innovation projects and virtual team meetings became possible*'.

Nevertheless, some *barriers* with respect to technology-structure interdependencies existed. Due to the use of new communication tools in the work model, communication patterns in the organization changed. Since employees were communicating directly without considering each other's hierarchical levels via tools in the platform, rather than using the formally designated lines of communication, the organization's formal processes were disrupted and some managers felt circumvented, '*I do not think that's great when my team make decisions without me, these should be discussed with me first. I had to intervene sometimes*'. These effects caused friction and impacted other areas of business negatively.

Third, we address the drivers and barriers with respect to *technology-task* interdependencies. The possibility to provide information with a high degree of structure and visibility formed a *driver* of digitized innovation development. The platform's implementation facilitated the description of complex innovation project ideas in a comprehensible form and language due to predefined procedures by the system. Within the innovation projects, the platform also compensated for the absence of individual team members through ongoing project documentation. As this technology fits perfectly with the task, it led to a decrease in projects' complexity and thus to improvement for every team member. One employee stated, '*I cannot always be there, we still have regular tasks and they have priority. But I can simply look up everything in the system'.*

Interdependencies	Drivers	Barriers
Technology – Actors	• Existing intranet structure Consequence: Acceleration of platform implementation; Participation in coordination and communication across different departments and projects; lowered entry barriers	• Low acceptance and usage rate of the intranet Consequences: Partly low user acceptance of digital innovation platform among specific groups of employees
Technology – Structure	• Standardization of idea submission • New communication tools Consequence: Efficient collaboration, possibility of virtual project teams	• New functionalities Consequence: Disruption of organizational processes
Technology – Task	• Documentation with high degree of structure and visibility Consequence: Decrease of innovation project complexity	• Limited functionality Consequence: Decrease in numbers of users and inefficient flow of information/task fulfillment

Table 3. Technology-enabled drivers and barriers.

Nevertheless, some *barriers* with respect to technology-task interdependencies existed. The limited functionality of the platform itself formed a technology-enabled barrier to digitized innovation development. For instance, the lack of an alert system for new incoming innovation ideas led to decreasing numbers of users and inefficient flow of information and task fulfilment. One employee claimed, '*Sometimes I accessed the platform for the first time in four weeks and there were ten new comments, but they were already*

three weeks old. This was frustrating. Sooner or later, no one will care about these innovation projects anymore'. The results of the technology-enabled driver and barriers are displayed in Table 3.

4.2 Organization-Enabled Drivers and Barriers

In addition to technology-enabled drivers and barriers, organizational factors also acted as drivers and barriers for implementing digitized innovation development in the new work model. First, we address the driver and barriers with respect to *actors-structure* interdependencies. *Drivers* of digitized innovation development were the following: The work model changed the way employees are managed and organized. Innovation teams were characterized by a low centralization as no formal hierarchies existed and decision-making occurred democratically. Interviews demonstrated that despite the lack of formal authorization, employees felt more valued because the organization granted them the opportunity to take responsibility for the task of leading an innovation team for a short time. One interviewee stated, '*You get the feeling that others listen to you, instead of only doing the same job every day*'. Moreover, the reward system that was implemented as an enhancement of the work model and based on employees' requirements incentivized employees to submit more innovation ideas. Additionally, due to the cross-departmental nature of the digital innovation platform in contrast to the regular structures in a public organization, employees were able to enhance their social networks within the workforce. As a part of the new work model people with varying backgrounds and different levels of expertise worked together on innovation projects. Due to the opportunity to form social ties with employees beyond their own department these organizational changes enabled a more effective collaboration among employees beyond employee-driven innovation projects, which had not been common in this public organization.

However, some *barriers* with respect to actors-structure interdependencies existed. Management's initial conservative assumption that such a work model could be implemented without incentivizing employees' participation proved to be incorrect. Accordingly, the work model was only used reluctantly in the beginning as apparent by the low participation rate in the first year. The works council denoted another major barrier hampering the implementation of innovation ideas. A successfully developed innovation idea that was to be implemented consequently within the organization faced many requests and requirements for a formal approval by the works council. Such additional review sessions and obstacles deterred employees from submitting new innovation ideas and hampered the implementation of ideas. Also, the reluctance of the works council to approve the platform led to uncertainties in the first year of its use. Moreover, the work model was also not automatically accessible to all employees, as it was subject to the supervisors' approval. Thus, employees with a strained relationship with their supervisor could not participate and submit their proposals. Similarly, conservative supervisors who believed that the public organization is not responsible for innovation did often not allow their employees to submit their own innovation ideas for approval, or to edit the ideas of others.

Second, we address the drivers with respect to *actors-task* interdependencies. Management's ability to identify employees with high potential in the work model formed a *driver* of actors-task interdependencies. For example, by observing employees' effort and success in the work model the public organization was able to better identify highly motivated employees that demonstrated project management expertise. Accordingly, we observed that former project leaders of an innovation project were promoted to positions with a high level of responsibility. Moreover, with the implementation of the work model a shift in the conservative organizational culture occurred and an innovation culture slowly emerged (i.e., employees' innovation mind-set). Since employees were exempted from regular task for five percent of their working time in this work model, employees had the chance to promote the progress of their innovation projects. Now, creative thinking and innovative tasks formed a regular part of employees' working time. The analysis of our interviews demonstrated that these developments not only shifted employees' individual perspective on innovation but also stimulated an innovation-focused organizational culture (caused by the collaboration within a platform without hierarchies and a flexible time to work on innovations). For example, one employee stated, '*Slowly my mind-set changed, because I felt that the development of innovation was also my responsibility'.* Even among employees who did not participate in employee-driven innovation projects directly, the perspective on innovations changed. Due to innovation development via a freely accessible digital innovation platform employees were informed about the continuous progress within the innovation projects. This gradually created a creeping acceptance of new ideas and innovations among all employees. One manager stated, *'I think some changes in the organisational culture have taken place, slowly task and values especially in the mind of younger employee change. Now innovation is everybody's business*'. In the end, innovation projects encountered lower levels of resistance compared to the beginning of our study.

Furthermore, an increased job satisfaction as a result of the introduction of innovation time formed another *driver* with respect to actors-task interdependencies. In the new work model employees had the opportunity to work on projects beyond their day-to-day business, which was extraordinary for a public organization. Further, they were able to specifically select whether and to which innovation projects they wanted to devote up to two hours a week of their work time. Some of the employees had already been interested in innovation topics before they were officially able to spend part of their working time on it. After the implementation of the new work model, new ideas could now be developed without compulsion and pressure, and new challenges facing the organization could be approached. Meanwhile, employees could collaborate with colleagues from other departments, with whom they otherwise were not able to work together due to lacking topic fit or job overlap. One manager stated, '*I think it is important to integrate everyone, because it not only promotes creativity, but also, of course, the exchange of knowledge and a social network among the entire workforce*.' Therefore, employees reported an increased overall job satisfaction due to the implementation of the new work model. In addition, the development of new skills in the new work model formed another driver. Some employees not only developed ideas on the digital innovation platform, but also took over the management and coordination of innovation teams. Subsequently, they learned and gained experience in team leadership, project coordination, as well as moderation of team members. Thus, these individuals were able to automatically expand their working skills through unintentional trainings triggered by the new work model. Additionally, the collaboration in innovation projects promoted the development of informal relationships among employees across departments. As a consequence, not only employees' satisfaction and organizational innovativeness but also organizational performance was enhanced. For example, our interviews revealed that innovation project members were able to better assess the skills and knowledge of their colleagues, apply their capabilities to new projects and day-to-day operations, and return to those individuals by involving them in projects with specific issues or asking them for advice. However, some *barriers* with respect to actors-task interdependencies existed. A common issue in the beginning was the lack of any innovation mind-set and the resulting resistance among employees against the work model. Some employees did not want to take part in innovation projects in addition to their regular tasks due time restrictions. Some employee stated, '*I do not want to be asked for advice and I do not have time for it. I have my regular tasks to do first; there is no time for more'*. Consequently, there were initial obstacles within the work model, because it was difficult to find employees with the required skillset.

Third, we address the drivers and barriers with respect to *structure-task* interdependencies. Higher flexibility of human resources formed one *driver* of digitized innovation development in the new work model. Even though innovation time was limited to five percent of employees' working time, this time could be scheduled flexibly across the year. Therefore, organizational slack was reduced as employees were able to shift between standard work procedures of their actual job and creative tasks in the innovation projects. Moreover, the implementation of the new work model slowly initiated a strategic rethink in the organization. One manager outlined that, '*While I thought that we here are not responsible for innovation at all or more especially the development of new processes or services, the introduction of an employee-driven innovation approach changed my understanding and also those of my colleagues. In general, a public organization can also invest in innovation development*'. Furthermore, before the implementation of the work model certain departments were reluctant to share information with others. Our second round of interviews indicated that due to the implementation of the new work model, this one-dimensional and conservative point of view changed slightly. Cross-departmental collaboration of all employees to develop novel ideas for processes and services became one strategic goal of the organization as several team leaders and managers explained in the interviews.

Apart from this, the following *barriers* with respect to structure-task interdependencies were observed to inhibit digitized innovation development: Although the structural changes of the organizational system through the new work model were beneficial in many ways, these occurred only slowly over time. Accordingly, digitized innovation development in the organization suffered from a predominantly conservative organizational structure, characteristic of public organizations. Due to the dominance of a silo mentality in the organization, certain departments did not wish to share information or collaborate with other employees. Moreover, a high degree of formalization impaired digitized innovation development. The high degree of regulation under which the public organisation was operating as well as the work counsel's requirements entailed a large number of rules and specific procedures in day-to-day business. Therefore, the regulatory requirements for the submission and approval of innovation ideas were also considerably high. Thus, effective collaboration was hindered by these structural factors. The results are delineated in Table 4.

Interdependencies	Drivers	Barriers
Actors – Structure	• Lack of formal authorization and hierarchies • Newly implemented reward system • Cross-departmental nature of the platform Consequences: Increase in employee satisfaction and employee motivation; collaboration due to formation of social networks	• Originally, lack of incentive structure • Requirements by works council • Low innovation support from supervisor Consequences: Low initial participation
Actors – Task	• Managerial possibility to identify employees with high potential • Freely and continuously available information about innovation projects via platform • Introduction of innovation time Consequences: Advantageous shift in innovation culture; development of new skills, formation of informal relationships	• Lack of innovation mindset Consequences: Resistance to participating in additional projects; difficulties in finding the skillset required
Structure – Task	• Innovation time: higher flexibility of human resources • Implementation of platform with new functionalities Consequences: Reduction of organizational slack; strategic rethink; cross-departmental collaboration	• Prevailing silo mentality • High formalization Consequences: Impaired digitized innovation development

Table 4. Organization-enabled drivers and barriers.

4.3 Innovation Champions

In the process of collecting interviews, meeting protocols and secondary data, we found evidence that single actors played a major role in work models' implementation and acceptance. This role of an 'innovation champion' (IC) was a major determinant for developing innovation ideas and bringing innovative change by promoting the implementation of innovation time and the digital innovation platform in the public organization. In innovation management and IS literature, the IC is defined as an individual who is willing to take risks to enthusiastically promote innovation projects (Jenssen and Jørgensen, 2004; Maidique, 1980; Howell and Shea, 2001). While interdependencies of the four different components always formed part of the STS model, we identify the tremendous role of the actor component, namely the specific role of an individual actor influencing all components' interdependencies. Due to the IC's significant role in realising and developing organizational innovation, we describe how the IC influenced all components and the corresponding interdependencies during the work models' implementation of digitized innovation development in detail below.

First, the IC impacted the component *actors* (where she is located herself) as well as its interdependencies with all other components. Through the informal influence of the IC, more employees became aware of the work model and actively participated in the project team, which was responsible for the work model's implementation. Additionally, the IC recruited other employees proactively from various departments for the project. Her recruitment decisions were partly based on colleagues' expertise and prior collaboration in projects. Moreover, she motivated the team by building up confidence and the work model's success during team meetings as mentioned by one employee, '*I think some of us did not believe in such an organizational innovation and the possibility of such a work model for a public organization, but Mrs. XX always encouraged us. This increased our motivation tremendously*'. The IC reinforced the organizational and technological drivers by actively promoting the implementation of the work model to other employees and therefore reducing resistance to innovation.

Second, the IC affected the component *structure* as well as its interdependencies with all other components. Hereby, the IC promoted work models' implementation vigorously through the various stages of the process and against resistance of the works council as well as other employees by personally taking risks of failure. In addition, after the work model's implementation the IC connected with others employees and built new networks via the digital innovation platform of the work model. The formation of these new networks brought a constant flow of other employees from different departments into the teams for digitized innovation development, which facilitated the transfer of information and knowledge from other innovation projects. One employee stated, '*I got to know so many new and interesting people in innovation projects… I even used their advice and ideas in other tasks…*'. During the work models' adoption the IC presented information to the works council to overcome administrative obstacles, which were critical for the successful implementation of the work model. Third, the IC influenced the component *technology* as well as its interdependencies with all other components. The IC promoted the implementation of the digital innovation platform. She even improved and customized the platform herself by implementing and programming new features in order to ensure a better user experience for other employees and herself. Consequently, the digital innovation platforms usage rates increased.

Finally, the IC influenced the component *task* as well as its interdependencies with all other components. Our data highlighted that the IC not only affected the work model's implementation, but that she also showed innovative behaviour in the work model itself by developing new ideas for the platform as well as

planning, controlling and pushing ideas forward until their implementation. The IC not only generated her own innovation ideas for the platform but also selected promising creative ideas and spread them among other employees in the public organization. During the implementation stage the IC worked directly with various team members, often in her leisure time and influenced their tasks.

4.4 Limitations

Although this case study delivers valuable insights into drivers and barriers for the implementation of a work model for employee-driven innovation development in a public organization, some limitations of our research approach need to be acknowledged. Our results only represent a work model for employee-driven innovation development and its related processes, people, and organizational influencing factors in one particular public organization and cultural setting. The examined drivers and barriers for people, technology and the organization might be different in other public organizations and countries. Besides, we noticed that 5 % devoted for "innovation time" might be a proportion of time too low to change a rather hierarchical organization. Therefore, the generalizability of our results might be limited to a certain extent. Yet, case study methodologists have insisted that a study involving just one case is acceptable (Sarker et al., 2013). However, our findings regarding the specific role of an individual actor can be logically generalized, because the underlying causal effect with respect to the STS interdependencies is context-independent for most public organizations implementing a new work model.

5 Implications for Research and Practice

By accompanying a public organisation for a period of two years we identified the drivers and barriers of the implementation of a work model enabling employee-driven innovation (RQ). We discussed how the two components of the work model, innovation time and the digital innovation platform complement one another and interact with technological and organizational components to enable digitized innovation development for employee-driven innovation and so enhancing organizational innovativeness by providing the necessaries for employees' incremental innovation idea development. Going one step further, we also identified the significant role ICs play for the work models' implementation, the interaction of different factors for digitized innovation development and how ICs influence all components and corresponding interdependencies of the STS model. Thus, our results contribute to IS literature as well as governance and innovation research by providing a first case study that develops a deeper understanding of a work models' implementation in a public organization in a digital age. Moreover, in realizing - as one of the first- a work model for planned innovation, which results in equilibrium according to Leavitt's diamond, we contributing to digital innovation practices in the public sector (and e.g. ambidextrous innovation in general in organizations), which might be in contrast to more risk-taking innovation approach that by definition challenge well-aligned structures in public organizations.

5.1 ICs as Necessary Element for the Implementation of a Work Model

We observed that ICs play a major role in the implementation of the work model for employee-driven innovation development. Due to their capability to motivate, inspire, and manage employees, they are an important influencing factor in the work model. Our results, for instance, show that employees in the public organization are sceptical of working on tasks that were not officially and formally assigned to them. They need collegial leadership and legitimacy intervention to provide them proactively with permission, enthusiasm and encouragement. Thus, the IC had a great influence on the two components of the work model, actors and task. As described a section above, our results highlight that this also applies to other components of the work model, such as structure and technology.

Prior research described the organization as a complex system with four interacting variables. In this STS model a change in one of the four variables within the STS model usually results in a compensatory change in the other variables (Leavitt, 1964; Lyytinen and Newman, 2008). In our case study we observed the tremendous impact of an entity incorporated in the actor component that influenced all other components of the STS model. Thus, the aforementioned IC leads to a higher importance and weight of the component actor, compared to other components in the original model. To our knowledge, this is the first case study that provides evidence of such an emphasis on one component in the STS model. Accordingly, we were able to extract the drivers and barriers for the process of organizational change in a digital context, more specifically the digital transformation in a public organization by including the IC. Leavitt (1964) states that organizational change is induced by initial changes in only one of the variables in the STS model. Yet, our case study delivered deviating evidence. We found that the IC as an entity incorporated in the actor

component induces and coordinates changes in all other factors of the STS model. Considering this role of the IC offers a new point of view to better understand drivers and barriers for the process of organizational change in public organizations in a digital age.

Building on our results, public organizations face a grand challenge in identifying innovative and competent employees in general and individuals that can act as ICs in particular. The work model, as exemplified in the case study, can act as one tool to identify individuals that have the skills and potential to promote projects, such as the implementation of the work model or driving innovation within such a work model on a digital platform. While some innovation development projects inside the new work model failed, others were highly successful. We observed that the existence of an IC was key to the realization of successful projects and the subsequent implementation of the innovative ideas. Thus, public organizations that aim to increase their innovativeness should identify potential ICs, give them the necessary and required space, freedom and job autonomy to unfold and further develop their potential.

In our case study we observed at the end of our period of observation that open and democratized structures in innovation teams prevail. Yet, the overall organization was still characterized by formal and old-fashioned transactional hierarchies. Individuals who connect both parts of the organization, such as ICs, are located in a field of tension between new and old organizational mind-set. Future research needs to explore how ICs can manage such conflicts. Alternatively, different group of innovation actors might be necessary to overcome these obstacles. Moreover, due to the ongoing digitalization in general, new challenges can be expected to arise for organizations. While we identified the IC as a major influence factor for the implementation of the work model, additional changes caused by the distinct nature of digital technologies call for further in-depth analyses.

5.2 The New Work Model as a First Step towards an Innovation Culture

Researchers expect innovation processes to become more open and democratized in a digitized world (Fichman et al., 2014). Whereas the body of literature about digital innovation in the public sector mainly highlighted and discussed the possibilities of open innovation (e.g. living labs) in public organizations (Gascó 2017; Kankanhalli et al. 2017), the internal crowdsourcing potential of their own employees on digital platforms has been mainly overlooked. Thus, how public organizations can manage changes in digitized innovation development by fostering employee-driven innovation had not been studied so far. Aligned with the expectations of different authors (Fichman et al., 2014; van Hippel, 2005), we provide one example for democratizing innovation discovery and for development becoming more open and employee-driven in a public organization. Since our study is only a first approach in realizing a work model for planned innovation, the resulting equilibrium according to Leavitt's diamond might be debatable compared to a more risk-taking innovation approach that by definition would challenge well-aligned structures. Thus, further research should investigate our approach more deeply in the context of ambidexterity (e.g., Gibson and Birkinshaw 2004) that deals with the balance between exploration and exploitation and thus considers incremental changes to existing practice as well as more radical ones. The digital innovation platform, one important component of this work model, enables ordinary employees in the organization to create and promote innovative ideas, which is not part of their job description. Yet, the implementation of the new work model itself is not sufficient to achieve organizations change and long-lasting improvements in organizational innovativeness. For broad acceptance of democratized processes, a new way of thinking among employees has to develop first.

Interviews and meetings records of the first phase of our case study emphasized that the organization's employees viewed themselves not to be responsible for innovation development. However, the analysis of data collected in the final phase of our case study demonstrated a change in the mind-set among employees as they started to express responsibility and commitment to contribute to digitized innovation development. The new work model triggered changes in employees' points of view and the silo mentality dominating the public organization started to dissolve. Depending on the degree of conservatism predominant in a public organization, these changes might unfold differently. Accordingly, further research is needed to investigate the long-term effects of the work models' implementation on organizational culture in public organizations.

The creation of the digital innovation platform opened innovation development to all employees in the organization and represented as first step towards creating an innovation culture in the public organization. Therefore, further research should investigate other influence factors for the formation of an innovation culture within a public organization in a digital age. Also, the possibility for employees to be released from regular tasks and to be granted innovation time demonstrated management's appraisal of individuals' innovation efforts and emphasized every employee's responsibility for generating innovative ideas. Only if em-

ployees consider themselves integral and valuable contributor of an organization's openness to change and innovativeness, they will continue to contribute innovative ideas and participate in the work model in the future. Employees have to recognize that they can strengthen an organization's power and efficiency through their individual contribution by being the owners of their own project. This might encourage the more conservative employees and the consequently slow-moving public organization into a new era, in which prejudices against such public organizations can be eliminated. A shift in the ownership of projects will also bring new challenges for public organizations. Employees will demand a stake of projects' profits, if their innovative ideas result in eminent financial gains for the organization. Questions arising due to employees' innovation ownership need to be addressed in the future. At the same time, research needs to derive propositions for the management of such issues. Moreover, in the long run discrepancies between the employees using the platform frequently and employees not participating in employee-driven innovation could arise. While the platform is characterized by democratic structures, the public organization itself has highly hierarchical structures, which form together with the work council, the lack of an innovation mindset, the high formalization and the prevailing silo mentality, as shown by our analysis, the main barriers for digitized innovation development in public organizations. Since these organizational structures are in strong contrast, future research could offer interesting insights on possible tensions arising due to the adoption of the work model in public organizations. So, innovation management today faces the challenge to move away from a mainly spontaneous and unstructured innovation approach to more specific programs managed and designed in order to increase employees' innovativeness in organizations with hierarchical structure and fixed process. Only if every employee experiences the innovation responsibility associated with the ownership of an idea, the evolution of an innovation culture is possible in public organizations.

6 Conclusion

The new work model for employee-driven innovation in the researched organization represents a new promising opportunity for public organizations to benefit from the creative potential of their employees and to enhance their ability to develop new ideas. Our case study puts in place an array of enablers or interventions to provide the needed resources, such as time and legitimization, for employees to take their innovation ideas forward. Overall, our analysis emphasizes that public organizations need four interacting enablers: 1) innovation time to foster innovative mind-sets among employees, 2) innovation champions who support employees in moving beyond the confines of their assigned work, 3) a digital innovation platform that enables the rise of an internal crowdsourcing community and provides employees with a sense of direction and facilitates collaboration, and 4) an innovation culture leading to beneficial changes in organizational structure. Moreover, our study is the first to provide an in-depth analysis and put a higher emphasis on the importance of the "actors" component compared to other elements of the STS model. Accordingly, we provide a starting point to better understand interdependences of work models in public organizations in a time of digital transformation. Our results underscore the potential benefits of breaking down hierarchical obstacles in public organizations in order to involve ordinary employees and encourage them to contribute with their creativity, skills, and knowledge to the digitized innovation process. However, our results also show that this will not work unless there are effectively balanced interdependences between all four aforementioned factors involved in digitized innovation development for public organizations.

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