IT CONSUMERIZATION AND ITS EFFECTS ON IT BUSINESS VALUE, IT CAPABILITIES, AND THE IT FUNCTION

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Abstract

IT consumerization is both a major opportunity and significant challenge for organizations. However, IS research has hardly discussed the implications for IT management so far. In this paper we address this topic by empirically identifying organizational themes for IT consumerization and conceptually exploring the direct and indirect effects on the business value of IT, IT capabilities, and the IT function. More specifically, based on two case studies, we identify eight organizational themes: consumer IT strategy, policy development and responsibilities, consideration of private life of employees, user involvement into IT-related processes, individualization, updated IT infrastructure, end user support, and data and system security. The contributions of this paper are (1) the identification of organizational themes for IT consumerization, (2) the proposed effects on the business value of IT, IT capabilities and the IT function, and (3) combining empirical insights into IT consumerization with managerial theories in the IS discipline.

Keywords: IT consumerization, IT capabilities, Business value of IT, IT function, IT management.

1   INTRODUCTION

The term IT consumerization is used to describe the increasing diffusion of consumer technology, such as smartphones, tablets or cloud applications, within organizations (Köffer, Ortbach and Niehaves 2014). It has been postulated as one of the most important IT trends and gained much attention among practitioners (Niehaves, Köffer and Ortbach 2012). Although IT consumerization is generally recognized as inevitable (Junglas and Harris 2013; Vanson Bourne 2013), practitioners are still inconclusive whether they should embrace the phenomenon or not (Kaneshige 2014). Furthermore, studies have noted a gap between employees and IT departments concerning the speed of adoption and use of mobile consumer devices (Gens, Levitas and Segal 2011; Koch et al. 2014).

Years after the first privately owned smartphones and laptop computers have been spotted in the workplace, the debate on how IT consumerization can create value for the organization is still ongoing. D'Arcy (2011) notices that organizations are in a "consumerization catch-22", meaning that organization are forced to provide their employees with up-to-date workplace technology, since otherwise users will skirt regulation and do not hesitate to bring what they need (Intel IT Center 2012). The IT function is often not delivering what business users need in terms of data access from mobile devices or flexibility with mobile device choice (Vanson Bourne 2013). Furthermore, a lack of shared values between the IT function and consumer IT may inevitably create conflict as an open IT consumerization policy will challenge traditional values of the IT function (Koch et al. 2014).

It is argued that IT consumerization embodies much more than consumer IT diffusion, it offers a chance for considerable productivity gains (Moore 2011). In fact, the trend provides a number of obvious opportunities to increase employee performance, for example, by transferring privately acquired IT-related knowledge to the workplace (Köffer, Ortbach and Niehaves 2014). At the same time, productivity gains are questioned. For instance, consumer IT is often used at work for non-work related activities (Schalow et al. 2013). On the cost side, some authors assert that capital expenditures can be reduced, since employees use self-purchased privately owned devices (Forrester 2012; Gens, Levitas and Segal 2011). In contrast, other authors foresee higher costs both in short and long term (Intel IT Center 2012) that are related to the underlying risks of IT consumerization (ENISA 2012).

As IT consumerization can have a significant impact upon the adoption and use of IT in organizations, it requires asking what it will mean for the management of IT in organizations, in terms of planning, organizing, controlling, and directing the introduction and use of IT within an organization (Boynton, Zmud and Jacobs 1994). For this study, we are particularly interested in IT management issues related to the business value of IT, IT capabilities, and the IT function. Therefore, the objective of this paper is *to explore the influence of consumerization of IT on IT management, in particular business value of IT, IT function, and IT capabilities*. To achieve this objective, we will firstly identify the main organizational themes of the consumerization of IT. This will be addressed empirically by a multiple case study. Secondly, we will explore the direct and indirect effects of these themes on the management of IT in organizations, in particular in relation to the areas of IT business value, IT capabilities, and the IT function. This will be addressed by a conceptual exploration based on managerial theories in the particular areas and illustrated by examples from the cases, where possible.

The remainder of this paper is structured as follows. We first address related work on IT consumerization and IT management. Thereafter, we present our research method: a multiple-case study in two organizations. Then we present eight IT consumerization themes that were derived from the case data and example quotes from the conducted interviews. We then identify and discuss the effects of the consumerization themes on the business value of IT, IT capabilities, and the IT function. The paper ends with concluding remarks.

2 RELATED WORK

2.1 IT consumerization

One stream of IT consumerization research focuses on bring-your-own-device (BYOD) programs as organizational strategy. Studies investigate the intention of individuals to use their privately owned IT for work (Lebek, Degirmenci and Breitner 2013; Weeger and Gewald 2014). Results suggest that individuals will subscribe to a BYOD programs, if they perceive them as beneficial despite limitations on their privately owned device through security mechanisms (Lebek, Degirmenci and Breitner 2013). Assuming that organizations strive for high degree of privately owned IT use, respective measures of the BYOD program must be deployed carefully to appropriately balance freedom and control.

A second stream investigated employee compliance in the context of IT consumerization. This stream has its foundation in the IS security awareness literature, which considers information security violations as major threat for organizations. Interestingly, literature acknowledges that employees violate security policies without malicious intentions (Guo et al. 2011), but with the desire to be more effective or to help others (Tarafdar et al. 2014). For the context of BYOD, Crossler et al. (2014) found that many workers are not aware of the severity of potential threats when using privately owned IT. Moreover, people will likely copy non-compliant behaviors of immediate peers (Ortbach et al. 2013). Putri and Hovav (2014) recommend that organizations should provide an IT support team that deals with technical issues related to privately owned devices in order to foster complaint behavior.

A third research stream has investigated stress outcomes of IT consumerization. Consumer IT that is used for both private and professional purposes facilitates work-life blurring (Köffer et al. 2015). Researchers call for more flexible policy design since individual attitudes towards work-life blurring differ considerably (Sarker et al. 2012). Companies should consider this views, instead of basing decisions towards work life blurring solely on organizational aspects (Köffer et al. 2014). In contrast, Yun, Kettinger and Lee (2012) argue for restricting employee flexibility since only clear boundaries between work and life will prevent people from unwanted multitasking.

Research stream	Implications for practice	Sources
BYOD intention	Establish BYOD programs to attract talent or unveil productivity benefits, carefully balance organizational policies towards freedom and control	(Loose, Weeger and Gewald 2013; Ortbach et al. 2013; Weeger and Gewald 2014)
BYOD compliance	Define and communicate a BYOD policy, provide training and organizational support for employees	(Crossler et al. 2014; Putri and Hovav 2014)
Impact on stress and work overload	Individual policy design, provide the opportunity to electronically separate work and life spaces, consider the private life of individuals	(Köffer et al. 2014, 2015; Niehaves et al. 2013; Schalow et al. 2013; Yun, Kettinger and Lee 2012)

Table 1.   Implications for practice in scientific studies about IT consumerization

Table 1 summarizes implications for practice in IT consumerization related scientific literature. Overlooking the methodologies, the sampled individuals are often recruited from the general workforce, and thus are not involved in a particular BYOD or IT consumerization strategy of an organization. Moreover, all of the mentioned studies use the individual as unit of analysis to derive strategic recommendations for organizations from user behavior as implications for practice. Thus, extant studies on IT consumerization rarely focus on organizational aspects. One exception is the study by Koch et al. (2014) who identify a value change of the corporate IT function, i.e. IT consumerization requires a constant realignment in the process to embrace "values like empowerment, choice, luxury, innovation and user self-support (p. 13). The authors call for future research on the management of conflicts that IT consumerization poses for organizations.

In addition to the aforementioned academic studies, numerous IT service providers have published market studies to analyze IT consumerization in order to derive recommendations for practitioners

(Niehaves, Köffer and Ortbach 2012). Overlooking these publications, in spite of its potential biases, several proposed strategies for embracing IT consumerization can be identified. The approaches are summarized by Table 2. While some studies postulate an increased importance of IT governance (e.g., control procedures), other studies recommend to transfer responsibilities to the end user (e.g., enable choice). Moreover, as this is practitioner literature, there is little attention for how these insights relate to our current understanding of IT from a managerial perspective within the IS discipline.

Approach	Description	Sources
Enable choice	Establish corporate policies that grant employees more flexibility and allow the choice between distinct devices and software, including privately owned IT.	(Dell and Intel 2011; Forrester 2012; Harris, Ives and Junglas 2012; PricewaterhouseCoopers 2011)
Recognize heterogeneity	Accept heterogeneity of IT on the market and integrate it into the architectural mind-set of the company to fulfil user needs.	(D'Arcy 2011; Harris, Ives and Junglas 2012; PricewaterhouseCoopers 2011)
Segment users	Classify employees into groups to adjust corporate security requirements or IT provision accordingly.	(Harris, Ives and Junglas 2012; PricewaterhouseCoopers 2011)
Control procedures	Build up control means like mobile device management that allow monitoring of diverse and employee owned hardware.	(PricewaterhouseCoopers 2011)
Update company IT	Provide modern company IT to reduce shadow IT and to foster	(D'Arcy 2011; Harris, Ives and Junglas 2012)

Table 2.   Proposed IT consumerization strategies in literature

2.2   IT management

IT management is associated with planning, organizing, controlling, and directing the introduction and use of IT within an organization (Boynton, Zmud and Jacobs 1994). For this paper we will focus on three main concerns for IT management: IT business value, IT capabilities, and the IT function as these are important topics in the IS literature and can be expected to be affected by IT consumerization based on the discussion of academic and practitioners literature presented above.

1) IT business value has been a prominent research topic in the IS discipline, and some even argue that it should have centrality in the IS field (Kohli and Grover 2008). Business value is often related to organizational benefits of IT or the relation between IT and firm performance. IT can result in different types of organizational benefits, such as strategic, informational, or transactional benefits (Mirani and Lederer 1998). The relationship between IT and business value is generally seen as indirect relationship with intermediate outcomes related to the use of IT (Soh and Markus 1995). Nevo and Wade (2010) focus on IT-enabled resources as intermediate outcomes for creating business value with IT. IT-enabled resources are 'systems that are formed through relationships between IT assets and organizational resources' (p. 166). Sambamurthy, Bharadwaj and Grover (2003) argue that digital options and agility mediate between IT competence and competitive actions. Digital options are "a set of IT-enabled capabilities in the form of digitized enterprise work processes and knowledge systems" (Sambamurthy, Bharadwaj and Grover 2003, 247).

2) IT capabilities are receiving significant attention within the business value of IT literature (Bharadwaj 2000; Melville, Kraemer and Gurbaxani 2004; Wang et al. 2012) and are also discussed in the IT function literature (Feeny and Willcocks 1998). IT capabilities stress the need for organizations to leverage IT assets on a continuous basis to deliver a sustained competitive advantage instead of the IT assets themselves (Bharadwaj 2000; Henderson and Venkatraman 1993; Peppard and Ward 2004). IT capabilities cover technical, managerial and relationship capabilities (Kim et al. 2011; Melville, Kraemer and Gurbaxani 2004; Piccoli and Ives 2005).

3) The <u>IT function</u> or IT organization refers to the arrangements (i.e. total set of structures, processes and accommodations) for managing and organizing IT in organizations (Earl 1989). According to Myers, Kappelman and Prybutok (1997), the success of the IS function depends on service quality, system quality, information quality, use, user satisfaction, individual impact, work group impact, and organizational impact. Rockart, Earl and Ross (1996) argue that the management of IT has become more complex and the IT organization has shifted from being primary a 'doing' function to a more business-centered, advisory and management function. Guillemette & Paré (2012) state that two important questions for the IT function are what is its strategic mission and how can this be translated into an IT management model.

In summary, we expect IT consumerization to affect IT management, in particular IT business value, IT capabilities and the IT function (Figure 1). For the business value of IT, we expect that IT consumerization can contribute to the creation of business value via IT-enabled resources and digital options and agility. For IT capabilities, we expect that IT consumerization requires technical, managerial and relationship capabilities. For the IT function, we expect that IT consumerization will affect the strategic orientation and management model.
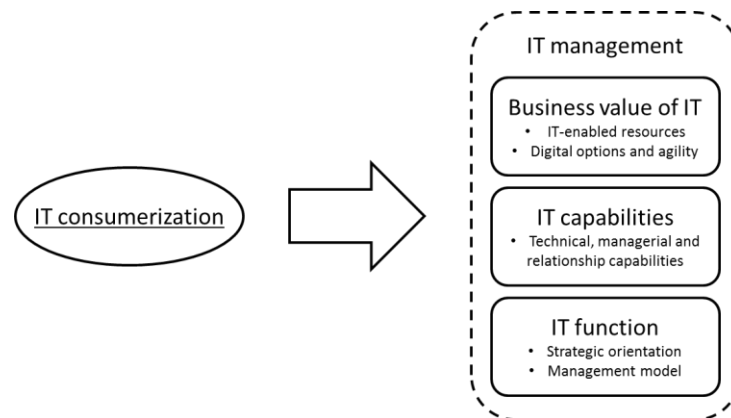

Figure 1.   A priori model for the managerial implications of IT consumerization.

3   METHOD

We chose a rather inductive qualitative design for our research endeavor since we argue that existing theories and models cannot be easily transferred to the context of IT consumerization (Eisenhardt 1989). For instance, the consumer IT features on mobile devices have changed the nature of professional tasks (Junglas, Abraham and Watson 2008). In addition, technology adoption behaviors for consumer IT differ considerably from current IS theory on this subject (Köffer, Ortbach and Niehaves 2014). In general, research is yet lacking a sound theoretical foundation of IT consumerization, and has not found a consensus about defining aspects yet (Ruch and Gregory 2014).

We selected two instrumental cases where our research interest could be easily observed (Stake 1995). Our cases were selected with maximum variation (most dissimilar system design) in order to look for joint and distinct patterns (Miles and Huberman (1994) and to find differences in organizational conditions that allow contrasts during data analysis (Orlikowski 1993). As a result, the two organizations have distinct IT landscapes. MANUFACT is a manufacturing company with rather strict IT policies. Employees work most of their time on the company's site. MANUFACT was elected for the study, because they started a pilot project to equip a couple of their managers and sales representatives with mobile IT devices like tablets and smartphones. The use of privately owned devices is clearly prohibited. In contrast, CONSULT is an IT consultancy, where employees spend most of their working time on the road. The company has relatively open IT policies, for example,

employees are allowed to use the corporate laptops for private purposes, including the installation of custom software like social media or games. The use of privately owned devices for work is permitted as long as no company and private data gets intermingled.

We selected interviewees who were expected to have profound knowledge about the consequences of the use of consumer IT for work, both privately owned and company provided. Hence, the respondents used consumer IT to get their job done, or supervised, or supported such employees. In order to increase variation of the data collection, we selected interviewees from different roles and hierarchy levels. We conducted semi-structured interviews with 13 respondents at MANUFACT and 10 respondents at CONSULT. Interviews lasted around 40 minutes on average, were conducted in person in semi-structured form, and later transcribed. Interview questions focused on the use of consumer IT for job tasks and on the expectations of the respondents towards organizational support of consumer IT use. Table 3 shows the roles of the interviewees in the two organizations.

Organization	Interviewee roles (Count)	Transcript length
MANUFACT	Management (CIO, CEO), Executives (5) Sales representatives (4), IT staff members (4)	51,546 words
CONSULT	Manager (3), Consultant (4), Back-Office (3)	31.736 words

Table 3.   Data collection and organizations

For data analysis, we draw on grounded theory methodology based on the recommendations by Strauss and Corbin (1998). We used iterative circles to ensure that generated open codes resulted from a constant comparison between emerging concepts and the data (Glaser and Strauss 1967). Data analysis of the second case (CONSULT) only started after the first iteration of the analysis of the first case (MANUFACT). Moreover, data collection and data analysis significantly overlapped, since the interviews of the second case were conducted during the ongoing analysis of the first case. In the coding process, two researchers first independently went through all the open codes in order to classify them into meaningful concepts. Differences between researchers were clarified in joint workshops with all authors involved. This process ended when all researchers agreed on a set of inductively derived concepts and their relationships, i.e. additional analysis led only to marginal changes.

4   FINDINGS

After finalizing data analysis, all researchers agreed on eight categories referencing 140 open codes and 196 text segments. Every category represents an organizational theme that was viewed as important to leverage the advantages of IT consumerization. A list of exemplary open codes for each organizational theme is provided in the appendix. Next, we will explain the distinct categories that emerged from inductive data analysis. Our findings are supported by citations from the case data.

4.1   Consumer IT strategy

Many aspects related to IT consumerization pose challenges towards the IT strategy. In general, it became apparent from the interviews that the role of the IS function is likely to change. In the words of a MANUFACT manager: *"The IS function should act as a service provider, not as a sheriff"*. Putting control over hard- and software selection completely into the hands of employees was not an option for our case companies. IT departments feared to get overwhelmed with new developments and called for meaningful boundaries that prevent inadvertent use of technology. This is also acknowledged by business departments. A manager from MANUFACT noticed: *"We don't have the resources to deal with new requirements [concerning private IT] every month. We will need some limitations"*. Several respondents saw the duty of the IS function to establish meaningful standards. A member of IT staff from MANUFACT emphasized: *"The employee has a legitimate interest to use private IT, because of customer requirements or working performance. Therefore, a certain tolerance*

is permitted in our company. However, everybody should see that this cannot be a permanent solution. We must provide a standard for that."

Strategy also relates to the external view on the company. A consultant from CONSULT pointed out that the situation may change, when people show up with their private IT at the customer: *"It is a disadvantage if employees, although it is forbidden, arrive at the customer with their private laptop and private data. This doesn't look coordinated. Think about ten different employees at the customer and everybody has a different laptop."* Furthermore, one MANUFACT manager pointed out that there should be congruence between the image and the IT equipment of an organization: *"At the customer it may look strange in case we use too modern IT equipment. They will say: Wow, they have much money. We must renegotiate the prizes."*

As regards costs, employees realized the opportunity for savings, since devices are bought by employees and not by the organization any more. However, respondents conceived that costs may increase due to follow-up developments. A sales representative from MANUFACT stated: *"Perhaps, it makes sense for the company to save invests. On the contrary, one has to take into account whether the saved invests for hardware will be offset by higher expenses for additional service tools."*

4.2   <u>Policy development</u> and responsibilities

An important aspect of IT consumerization is the formulation of guidelines that regulate the use of consumer IT. Most respondents agreed on the fact that employees should not be suppressed by excessive regulations and policies. However, a set of meaningful policies that clarify responsibilities and determine restrictions was seen as absolutely necessary. A manager described the philosophy of MANUFACT: *"We don't want to regulate everything in detail. We want to provide our employees with the greatest possible freedom to practice personal responsibility."* Despite this philosophy, MANUFACT does not permit the use of privately owned IT for work. In particular, it is strictly forbidden to store company data on private devices. A member of IT explained: *"The end user won't feel responsible for company data stored on a privately owned device. That is why we have a clear policy that prohibits this. I do totally agree with this."*

Guidelines may also regulate the increasing opportunities to work anytime, anyplace, i.e., when employees should be reachable on their private or corporate mobile phone. One CONSULT employee called for restrictions: *"It would be nice to shut down the cell phone after 8pm. It is an advantage, if the company regulates this centrally ... If everyone is prepared for that fact every day, one could perform work tasks in the designated time frame before. People would better relax".*

4.3   Consideration of <u>private life</u> of employees

When employees dual use IT for both work and private purposes, boundaries between work and life spaces become inseparably blurred. Consumer IT, through its functionality and mobility, facilitates this dual use. CONSULT employees, who work on the road at the customer, appreciated the possibility to integrate work and private matters on one single device. One consultant stated: *"When I am traveling, I take only my corporate notebook with me. I don't want to carry two devices all the time. My company permits reasonable private use, although no clear rules are defined for that."* This behavior required that CONSULT permitted particular freedoms in terms of IT use. When deciding on hard- and software provision, CONSULT was aware about the private needs of their employees. This consideration included hedonic aspects. One CONSULT consultant proposed: *"I would adjust the hardware in a way, so that it has a stronger performance, for example in the area of 3D graphics. Then, I could use it in the evening for playing games."* Indicated by the two statements, this wish for consideration of private matters was rather an issue for the CONSULT case than for the MANUFACT case. At MANUFACT, most employees tried to maintain electronic separation between work and life spaces. Since employees at MANUFACT were mostly working on company's site, there are fewer opportunities for mobile access on company data.

4.4   User involvement into IT-related processes

Actively involve users into IT-related processes represents a part of a responsibility shift from the organization to the individuals. For instance, respondents felt responsible for their knowledge about IT tools and processes and are requested to transfer privately acquired knowledge to the workplace. A member of the MANUFACT IT department shared his view: *"I think that people bring in know-how from the private realm. In my role, it is very important for me to know what is possible."* Such knowledge transfer from the private realm can also be beneficial for the organization in terms of innovation. A CONSULT employee asserted: *"If somebody has intensively studied a certain topic at home, and has found something useful what brings the project forward, the person can provide impulses. This would be a great benefit for the company."*

As soon as people want to try out their private experiences, they need certain support of their organization. At MANUFACT, this was often not the case. A manager complained: *"I cannot test software on my [corporate] IT. I must call the support and ask 'Can you release this for me?' Only then, I can test it. After this, [the software] must be uninstalled [by the support] again. That's why, I usually not going to test it."* The last statement showed that the IT function is viewed negatively, if users think that policies are formulated to strict and undermine their sovereignty.

4.5   Individualization

The case data were ambiguous whether organizations are required to address the technological requirements of their end users more precisely. For some respondents, "one-size fits all" was not an option any more. Instead, systems are designed subject to individual requirements and preferences. A consultant from CONSULT stated: *"I think, we must introduce individual hardware. For example, our consultants will be satisfied with the current hardware. (...) But our developers will need more powerful products. We should view this in more differentiated manner."*

However, other respondents pointed out the individualization may not have the desired effect. For example, employees may overestimate themselves and create unproductive technology solutions. A member from MANUFACT IT staff stated: *"There will be difficulties, if people start using software without any clue about it."* One interviewee completely doubted the meaningfulness of individualization, since it will never be possible to fulfil anybody's wishes. A respondent from CONSULT mentioned groups of employees that are not interested in customizing their workspace: *"There are colleagues that don't customize anything. They are perfectly fine with the IT that is provided to them. They even do not change the desktop background."*

4.6   Update IT infrastructure

Organizations with outdated IT infrastructure run the risk that their employees will no longer obey to the provided hard- and software. Typical examples of good IT infrastructure that were mentioned in the interviews were sophisticated data access anytime and anywhere, features of corporate IT as well as regular updates ensuring that corporate IT is up-to-date. An IT staff member of MANUFACT described how modern consumer IT can facilitate work: *"Especially for employees that are often on the road, cloud storage has enormous advantages. I can easily upload my word and presentation files. While waiting at the airport, I have access over my smartphone, tablet or notebook. Even on the plane, I can continue my work."* However, such work behaviors were not possible at MANUFACT the time of the investigation. In particular, the use of cloud storage is strictly forbidden.

At CONSULT, corporate IT is more up-to-date so that respondents seemed to be more satisfied with the IT infrastructure of the organizations. One consultant shared the satisfaction: *"Since ten years, I have not bought private hardware any more. (...) I have relatively good IT equipment, which I can also use for private purposes. Thus, I have many advantages. Moreover, I have no costs and don't have to synchronize anything."* Interviewees expressed higher demands concerning the quality of IT infrastructure. The last statement makes clear, how modern equipment can result in a capability of the

organizations, as it increases satisfaction, policy adherence and IT use. In this context, a manager from MANUFACT shared his vision on the future IT: *"Theoretically, you could ask anybody: Do you want to have MANUFACT hardware, or do you want to work with your own stuff?"*

4.7 End user support

The specifics of a diverse IT infrastructure were difficult to overview and confronted the organizational IT support in the case companies with new challenges. A manager of MANUFACT stated: *"Everybody has a different system, and everybody wants to have everything. Then, one must assign special personnel only for supporting that."* In addition, there were obstacles that arised by the use of privately owned IT. An IT staff member from MANUFACT explained: *"In the case of individual installations, support will be more difficult. For example, we use automatic software distributions. If somebody needs an application update, we can perform a remote install. That is, of course, not possible with privately owned IT."* For most respondents it was clear that the organization cannot offer full support for privately owned IT tools. A CONSULT employee stated: *"If anything goes wrong with private IT, but you need it for a certain issue at the customer, or any other professional situation, there is no chance to call the help desk."*

In contrast, other respondents referred to more tech-savvy employees that do not require much support for IT-related questions. Nonetheless, there was the question how people would react, if the corporate IT support tried to solve errors on privately owned devices. A MANUFACT manager pointed out: *"It's a matter of private data. I doubt that employees will hand over their private device to IT [department]. That has something to do with trust."*

4.8 Data and system security

Data and information security were probably the biggest concerns towards IT consumerization that were mentioned in the interviews. These concerns included setting up adequate protection and control mechanisms. It was feared that important software applications might be banned in future because of security reasons. A CONSULT consultant accepted this by stating: *"Online cloud storage is a nice example. It is perfect for sharing data. But private and corporate data would be intermingled, which is a big problem for data security and a no-go."* At MANUFACT, respondents were not fully aware of the company guidelines concerning the use of privately owned consumer IT for work. One IT staff member characterized this as big problem for the organization, because employees will not be aware of the consequences. The employee shared an honest and unmistakable explanation to everybody: *"Listen, if you use this [device] and overtake the liability for that, you might ruin yourself. If something goes wrong, for example you lose any confidential information. You will be held responsible for that, because you did not have any permission to do this from anybody."*

5 DISCUSSION

Based on the inductive analysis of the two cases, we identified eight IT consumerization themes. They resemble in parts the ongoing discussion in the IT consumerization literature. For instance, consideration of private life, user involvement, and individualization relate to the discussion how to apply technology more precisely to target individual user's needs and preferences (Baskerville 2011; Köffer et al. 2014). More technical-related themes, such as end user support, update IT infrastructure, and data and system security, reflect major risks and concerns of IT consumerization that have been raised by practitioners (Niehaves, Köffer and Ortbach 2012). Finally, the themes of strategy and policy development resemble the quest for appropriate strategic guidelines that balance employee autonomy and control (Harris, Ives and Junglas 2012; Koch et al. 2014).

While IT business value, IT capabilities, and IT function may all be affected by the eight themes, we focus here on three major implications (direct effects, white arrows in Figure 2), to demonstrate the

most relevant. Firstly, we propose that there are implications for IT business value that are particularly related to the user related themes (user involvement, individualization and consideration of private life). Secondly, we propose that there are implications for the IT capabilities that are particularly related to the technology related themes (end user support, IT infrastructure and security and data). Thirdly, we propose that there are implications for the IT function that are particularly related to the organizational related themes (strategy and policy and responsibilities). In addition, we also propose that these implications affect the relation of IT capabilities with IT business value and of IT business value and IT capabilities with the IT function (indirect effects, grey arrows in Figure 2). Next, we will discuss the IT consumerization themes and the effects in more detail and relate this to the literature.
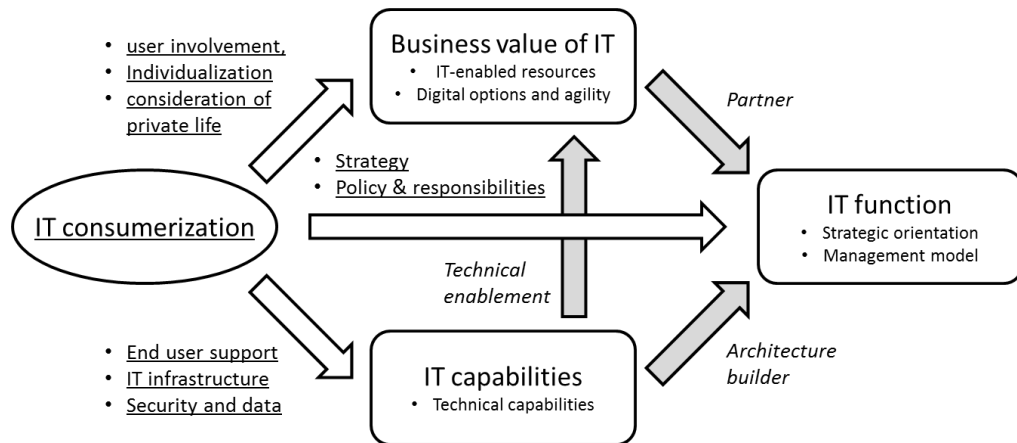

Figure 2.   Posteriori model for the managerial implications of IT consumerization.

5.1   Business value of IT

We suggest that IT consumerization, through user related implications, in particular user involvement, individualization and consideration of private life, can increase the potential synergy between IT assets and organizational resources and can contribute to realizing synergy. The synergistic relationship between IT assets and organizational resources can give rise to IT-enabled resources that create business value (Nevo and Wade 2010). User involvement can help making the full extent of IT assets' business value apparent by their direct embeddedness in the organizational resources, for instance, by using personal social media accounts to increase the interaction with customers. To this end, employees can no longer be treated as just passive users of technology (Junglas et al. 2014). Instead, their active and voluntary decision to use technology is part of the value creation through IT. Individualization can make different interactions between IT assets and organizational resources possible that increase the potential synergy. Acknowledging the often very specific character of IT-supported processes in organizations, skillful individuals might be the best judge in order to decide on technologies, transforming them into IT-enables resources (Harris, Ives and Junglas 2012). Furthermore, consideration of private life can contribute to realizing synergy by increasing the compatibility between the IT asset that users bring in from their private realm and the organizational resource and decreasing the integration effort, e.g., import personal social media updates into the corporate social network.

IT consumerization can also contribute to IT business value via enhanced digital options and organizational agility. Firstly, user involvement can contribute to operational agility by enabling a speedier and more cost-efficient exploitation of innovation opportunities for the business processes. Given the increasingly distributed IT competence across organizations (Davis, Kettinger and Kunev 2009), more and more individuals acquire particular IT know how in their private space. Thus, there is likely an accelerated speed of adoption for business scenarios (Köffer, Ortbach and Niehaves 2014; Niehaves, Köffer and Ortbach 2012). Moreover, overlaps between private and business information systems can increase agility, for example, by simplifying purchasing and managing expenses

(Baskerville 2011). Secondly, individualization can create digital options that are not possible through standardized corporate solutions. For example, the use of private devices in combination with social media software can significantly enhance digitized knowledge richness.

5.2   IT capabilities

We proposed that IT consumerization will affect the IT capabilities. While over time all these capabilities can be affected by IT consumerization, we expect that in the short-term the effects on the technical capabilities will be most prominent. To create the technical conditions for leveraging IT consumerization in the workplace, there is a need to address technical implications, in particular by addressing security and data issues, and providing user support. Only then, the technical basis will enable the business to be more involved in building IT functionality (Raj, Sepple and Willcocks 2013). An effective solution for the technical foundation may include various components of cloud services, desktop virtualization, and mobile device management (D'Arcy 2011). Hence, IT consumerization requires advanced technological capabilities of an organization to deal with new features, more variety, more flexibility, etc. Technical staff need a deeper understanding of what services are required that exceed their traditional core competencies (Raj, Sepple and Willcocks 2013).

In our case data, technological capabilities concerning user support and data access are missing at MANUFACT. Consequently, MANUFACT is not able to leverage benefits from IT consumerization and rather focuses on risks and threats. Similarly, Koch et al. (2014) found that in early stages of the introduction of consumer IT at work, projects may be hampered if employees perceive consumer IT rather as luxury instead of recognizing their additional organizational value. The diffusion of consumer IT in organizations has been compared to the emergence of end user computing in the 1990s, i.e. the use of IT outside the IS department through personal computing (Baskerville 2011; Harris, Ives and Junglas 2012). In this context, different stages of development have also been proposed. In the model for end user computing effectiveness by Brown and Bostrom (1994), organizations that strive for higher end user computing growth in early stages should pursue decentralized decision-making with less emphasis on formal regulations. With low technical capabilities, organizations like MANUFACT tend to be skeptical in terms of opening guidelines and transferring decision-making authority to more people. Instead, security considerations are overestimated and hamper any further development (Gens, Levitas and Segal 2011).

Having the technical IT capabilities to embrace IT consumerization in place – primarily directed at fostering end user support, as well as an enhanced data and system security – it can increase the compatibility and decrease the integration effort for the formation of IT-enabled resources (Nevo and Wade 2010). This is evident from the case comparison between MANUFACT and CONSULT. While MANUFACT is still struggling to provide a secure infrastructure for mobile devices and applications, CONSULT already profits from efficient mobile work practices and employees that work with flexible schedules. In addition, the technical capabilities for IT consumerization can also enhance organizational agility and enable new digital options as technical problems and complexity can hinder exploration, decrease speed and limit opportunities (Sambamurthy, Bharadwaj and Grover 2003). At MANUFACT, for instance, missing opportunities to remote access company data prevents sales representatives to work more effectively when they are out at the customer.

5.3   IT function

We proposed that IT consumerization will affect the IT function. The IT consumerization theme of strategy relates to defining the strategic mission of the IT function in relation to IT consumerization. In particular, it is about balancing the need to support users in their use of private IT in a corporate setting while also dealing with resource constraints, customer perceptions and cost considerations. Koch et al. (2014) found several conflicts the IT function hereby faces. For instance, IT function's ability and user expectations do not match, if end users still require the IT function to support everything which is unlikely given the heterogeneity of consumer hard- and software. IT

consumerization themes such as, policy development, support and user involvement, thus, resemble the debate of how much autonomy and responsibilities should be granted for end user that experience limitless freedom with consumer IT in the private lives (Koch et al. 2014; Weeger and Gewald 2014).

Guillemette and Paré (2012) suggested two major roles for the IT function, i.e. it may act as a partner or architecture builder. The IT function as *partner* adds value by improving business processes and facilitating change (Guillemette and Paré 2012). Similarly, Agarwal and Sambamurthy (2002) see the IT function as an active partner in business innovation. We argue that whether the IT function has the opportunity to become a partner within the context of IT consumerization will depend on the creation of IT-enabled resources and new digital options, i.e. the business value of IT. For instance, an IT function that actively supports the effective use of consumer IT – thereby enabling the end users to choose IT on their own – might reveal additional innovation benefits (Harris, Ives and Junglas 2012).

The IT function as *architecture builder* adds value by implementing a single, integrated and flexible architecture, which enables the firm to benefit from new opportunities. Similarly, Agarwal and Sambamurthy (2002) propose a platform model where the IT function facilities business innovation across the enterprise by providing a scalable, seamless and flexible infrastructure. Whether the IT function can fulfil a role as architecture builder with regard to IT consumerization depends on the technical IT capabilities, which are needed for advancing the IT infrastructure. For instance, law regulations will require the organization to ensure a certain degree of data and system security (ENISA 2012). Such responsibilities cannot be outsourced entirely to employees.

6   CONCLUDING REMARKS

In this paper, we discuss managerial implications of IT consumerization, in particular the effects on the business value of IT, IT capabilities, and the IT function. We identify eight organizational themes. Based on these themes, we propose direct effects on the business value of IT in relation to IT-enabled resources, digital options, and agility via the consideration of private life, user involvement and innovation, and individualization. We propose direct effects on IT capabilities in relation to the required technical capabilities via IT infrastructure, end user support, and security and data. Moreover, we argue that these technical capabilities will stimulate the creation of IT business value. We also propose direct effects on the IT function in relation to the strategic orientation and management model via strategy as well as policy development and responsibilities. The creation of business value requires a partner model and the technical capabilities require an architecture builder model of the IT function.

Despite the natural limitations of qualitative research, the results encourage us to further investigate the relationship between IT consumerization and fundamental managerial topics of IS research. Particularly if account is taken of the fact that IT consumerization is more than just consumer IT diffusion, it implies a reconsideration of management concepts. Acknowledging the sparse empirically grounded academic literature on the topic, future research can address this gap by further qualitative studies that base their theoretical sampling on dedicated projects to embrace the trend, e.g., BYOD programs or technical projects to deploy desktop virtualization or mobile device management. Studies may also juxtapose managerial requirements of IT consumerization with those presented in IS theories, for example challenging existing IT capability sets, or theories on business IT alignment.

7   ACKNOWLEDGEMENTS

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APPENDIX

Table A1 provides a list of exemplary open codes for the organizational themes that were derived in the process of qualitative data analysis.

Theme	Exemplary open codes
Consumer IT strategy	Define core requirements of devices, Establish standards, Position IT as service provider, Match IT equipment and image, Open IT for non-standardized devices Overview about IT needs, Realize cost savings through private IT
Policy development and responsibilities	Balance freedom and policy regulations, Clarify liabilities in case of damage, Decide about device ownership, Ensure control of private IT, Ensure licensing and legal usage of licenses Prevent that people use IT without knowledge
Consideration of private life of employees	Adjust device performance also to private needs , Allow private use of work IT, Let user overlap and separate work and life Tolerance for private overlaps
User involvement into IT-related processes	Create test environment for employees, Encourage user participation, Inclusion of business in IT decisions, Let users test software, Outsource responsibility to end user, Profit from experience about private IT
Individualization	Enable that employees can use distinct IT, IT people must be able to work with different devices, Let employees use custom software, Let employees choose their IT, Let user customize their IT
Updated IT infrastructure	Enable employees to work anytime, anywhere, Get used to faster update cycles, Hardware independent data access, Provide intuitive IT, Offer online and offline work
End user support	Assistance for non-tech-savvy users, Intensify the support (for various devices), IT support only for basic functions, Remote installations on private IT, Support for private IT
Data and system security.	Availability of adequate anti-virus software, Clarify security issues, Clear legal issues for employees, Increase security efforts, Inform employees about risks of private IT usage, No company data on private devices, Release users from security concerns, Save data after device losses

Table A1.   Exemplary open codes for organizational themes