Can Shadow IT Facilitate Knowledge Sharing in Organizations? An Exploratory Study

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Can Shadow IT Facilitate Knowledge Sharing in Organizations? An Exploratory Study

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Abstract: Employees increasingly use unauthorized technologies at the workplace, referred to as Shadow Information Technology (SIT). Previous Research identifies that shadow technologies are often collaborative systems used by employees to communicate and share content with co-workers, clients, or external partners. Considering that Shadow Information Technology is often a collaborative system, and its usage has the objective of effective and productive completion of work tasks, we propose that this employee initiative, called Shadow Information Technology, can stimulate organizational knowledge sharing (KS), which is central to knowledge management practices. Knowledge sharing can leverage innovation and organizational learning, increase productivity, among others benefits. Thus, this research aims to analyze how knowledge sharing occurs via Shadow Information Technology. This is an exploratory study based on a qualitative approach. We performed interviews with ten Information Technology users to understand how knowledge sharing occurs through Shadow Information Technology. Our findings identify that most of the respondents use collaborative systems and mobile devices unauthorized by the Information Technology department to share knowledge and communicate faster with their co-workers. The most common shadow systems cited are WhatsApp and Skype, as well as solutions to store and share content, like Google Drive. In addition, several employees reported using Shadow Information Technology mainly because organizations do not provide suitable tools to communicate efficiently. We conclude that Shadow Information Technology can facilitate knowledge sharing, especially when people are geographically distributed, since these shadow systems provide faster and dynamic communication. Our theoretical contribution is to expand current knowledge about Shadow Information Technology and reinforce the importance and prevalence of informal and decentralized knowledge sharing within organizations. As for the practical implications, our paper can help Information Technology managers to understand Shadow Information Technology usage, how they can balance the risk and benefits of this phenomenon, and how knowledge sharing can be facilitated by Shadow technologies.

Key Words: Shadow IT, Knowledge Sharing, Collaboration, IT Management

1. Introduction

The importance of knowledge management (KM) for firms is not something new. Knowledge is considered one of the most valuable resources for the growth and sustained competitive advantage of the modern organizations (Shin and Kook, 2014)

Since the rise of the Internet, a growing number of collaborative tools such as communication and content sharing software have allowed individuals working at different sites to create and share knowledge, which is a reality for several companies nowadays. Although much knowledge is shared between co-located individuals, the case for creative activity to occur in a geographically distributed environment, either in globally dispersed research and development units of large companies or in online communities, is becoming increasingly relevant (Amin and Roberts, 2008).

Recently, the use of social media (SM) in organizations has become more popular. Previous research on SM shows how companies can use it to improve communication and collaboration, the opportunities it represents for knowledge creation, and knowledge sharing with co-workers (Väyrynen, Hekkala, and Liias, 2013). However, most of these collaborative technologies such as SM and other communication and content sharing software are considered informal and are unauthorized IT tools by IT managers, referred to as Shadow Information Technology (SIT).

Shadow IT is any IT solution used by employees to perform their work tasks without the approval and formal support of the IT department (Györy et al, 2012; Rentrop and Zimmermann, 2012; Silic and Back, 2014; Walters, 2013;). Research on SIT shows that most technologies listed as Shadow IT in companies are collaborative tools such as software for communication and content sharing (Rentrop and Zimmermann, 2012; Silic and Back, 2014). Examples of these systems are WhatsApp, Dropbox, Skype, Facebook, Google Apps, among others.

Companies encourage the heavy use of e-mail for communication and knowledge sharing. However, e-mail in particular can be a great waste of time, giving employees a sense of being occupied instead of helping them achieve useful results for the business (Goodwin, 2014). For this reason, employees search for technologies that promise more effective communication, e.g., social media and instant messaging software. On one hand, some research argues that the use of collaborative systems like social media can represent a risk to knowledge protection (e.g., Manhart and Thalmann, 2015; Väyrynen, Hekkala and Liias, 2013). In a similar vein, Shadow IT, which oftentimes is a collaborative system, is also related with information security concerns (e.g., Fürstenau and Rothe, 2014; Walters, 2013). On the other hand, Silic and Back (2014) found that employees extensively use Shadow IT software that influences their productivity and enables faster and better collaboration and communication.

Considering the above, we propose that Shadow IT as collaborative technologies can facilitate knowledge sharing, bringing benefits to organizations. Thus, this is the general research question that this paper aims to answer: How does knowledge sharing occur through Shadow IT? This study intends to address this question by analyzing how knowledge sharing occurs via a shadow system.

The article reviews the literature on knowledge sharing and Shadow Information Technology in Section 2. Section 3 outlines the research methodology. Section 4 presents the findings of the qualitative data analysis. Section 5 discusses research contributions to theoretical and practical implications. The paper concludes with a summary of the findings of this study, implications for the academic community and practice, research limitations, and suggestions for future research.

2. Literature Review: Sharing Knowledge through Shadow IT

In this section, the literature review that supports this research is described. Based on previous work, we could find a relation between Knowledge Sharing and Shadow Technologies, which is explained and justified below.

2.1 Knowledge Sharing

The definition of knowledge can vary from discipline to discipline. According to Ragab and Arisha (2013), the most common definition of knowledge is that it is the top tier in a three-level hierarchy that begins with "data" (i.e., raw facts), which, when processed, then yields "information," which, when combined with experience and judgment and applied in decision-making, finally becomes "knowledge." Nonaka and Konno (1998) differentiate between tacit and explicit knowledge. Explicit knowledge can be expressed in words and numbers. For instance, a document, once it is formalized, can easily be communicated and shared. Tacit knowledge, on the other hand, is highly personal and hard to formalize, making it difficult to share and communicate with others.

In this paper, we consider knowledge management (KM) based on Schultze and Leidner (2002). According to these authors, KM is the generation, representation, storage, transfer, transformation, application, embedment, and protection of organizational knowledge. The process of knowledge sharing (KS) can be considered central to knowledge management. Iskoujina and Roberst (2015) argue that in the process of sharing, knowledge is not only distributed but also transformed in the act of articulation, interpretation, and absorption. Therefore, when knowledge is shared, new knowledge is being created.

To Vanden Hoof and Ridder (2004), KS is the process where people mutually exchange their knowledge and jointly create new knowledge. Furthermore, the authors consider KS to consist of donating and collecting knowledge. Knowledge donation is communicating one's own knowledge to others, while collection is consulting with colleagues and having them share their knowledge.

The relationship between knowledge sharing and incentives is discussed further by the studies. Ipe (2003) explains how significant changes had to be made in the incentive system to encourage individuals to share their knowledge, particularly through technology-based networks in organizations, such as technology-based systems that facilitate the speedy sharing of knowledge. The author argues that the key to successfully managing knowledge is now seen as dependent on the connections among the individuals within the organization.

Similarly, Maki-Komsi, Poyry, and Ropo (2005) suggest that factors such as the communication of required information and agility of the tools in use contribute to successful knowledge sharing. However, organizations have to find a balance between knowledge sharing and knowledge protection, an increasingly important issue due to recent developments in social media and mobile technologies, which generally facilitate knowledge sharing (Manhart and Thalmann, 2015). Moreover, Väyrynen, Hekkala, and Liias (2013) argue that stronger social media penetration further increases

the number of informal networks; consequently, this aspect gains even more relevance as employees can use these informal networks to share knowledge.

Thus, technology plays a strategic role in the KS process. Since communication and knowledge sharing are crucial to organizations, providing a suitable system to effectively communicate and share information with co-workers becomes an important factor to encourage employees to share their knowledge. In this context, Shadow IT can signal that organizations are not providing their employees with adequate tools.

2.2 Shadow IT

Rentrop and Zimmermann (2012) define Shadow IT as a collection of systems developed by business departments without the official support of the IT department and are generally not known, accepted, and supported by the IT department. It represents all hardware, software, or any other solutions used by employees inside the organizational ecosystem that have not received any formal IT department approval, according to Silic and Back (2014). With this in mind, we define Shadow IT as any IT solution used by employees to perform their work tasks without the approval and formal support of the IT department (Györy et al, 2012; Rentrop and Zimmermann, 2012; Silic and Back, 2014; Walters, 2013).

The definition of SIT usage is also crucial to understanding this phenomenon. Haag and Eckhardt (2014) define individual shadow IT usage as the voluntary usage of any IT resource that violates the organization's IT norms and a reaction to perceived situational constraints that arises from an intention to enhance work performance, not harm the organization. This definition claims that the shadow IT user acts alone with the primary objective of effective and productive completion of work tasks which is jeopardized, for instance, by malfunctioning or inadequate organizational IT systems or instructions (Haag and Eckhardt, 2015).

Based on the above, one of the first factors in understanding SIT usage behavior is the employee's objective: to perform work tasks more efficiently and consequently become more productive. Silic and Back (2014) found that employees extensively use Shadow IT software that boosts their productivity and enables faster and better collaboration and communication. Secondly, employees either believe that they are not doing anything wrong or are not aware of it, because they do not know the organization's IT policies. Silic and Back (2014) argue that employees seem to be aware of the potential risks behind Shadow IT use yet continue their behaviors. However, the organization also has a share in the blame for this deviant behavior by not providing appropriate systems for employees to perform their tasks. With this inattention, they carelessly accept possible security incidents and damages to organizational IT assets, according to Haag and Eckhardt (2015).

Through a review of the literature, we selected the most common sort of Shadow Information Technology. We divided STI in three types: cloud services, solutions developed or installed by employees, and employee-owned devices. Table 1 demonstrates a summary of the SIT types, their descriptions, and respective authors.

Table 1: Types of Shadow IT Usage

Shadow IT	Description	Authors
Cloud Services	Internet-based Software and Software as a Service (SaaS) such as communication and content sharing software to communicate and share work information with co-workers, clients, and partners, as well as other cloud services that are not authorized by or are unknown to the IT department. These systems are also called Mobile Shadow IT, since they can be accessed outside the workplace. Examples of these systems are WhatsApp, Facebook, Skype, Dropbox, Google Apps, etc.	Rentrop and Zimmermann (2012); Györy et al (2012); Fürstenau and Rothe (2014); Silic and Back (2014); Zimmermann, Retrop, and Felden (2014); Gozman and Willcocks (2015), Huber et al (2016).
Solutions developed or installed by employees	Solutions developed or simply installed by employees on the company's computers (or another company device) to perform their work tasks. Examples can include software developed by employees to perform a task, an Excel spreadsheet, a free download of software available online, and so forth.	Rentrop and Zimmermann (2012); Györy et al (2012); Fürstenau and Rothe (2014); Silic and Back (2014); Zimmermann, Retrop and Felden

		(2014); Gozman and Willcocks (2015), Huber et al (2016).
Employee-owned devices	In terms of hardware, SIT can be mobile devices (smartphones and tablets), notebooks, servers, routers, printers, or other peripherals purchased by employees. These devices are purchased directly from retail rather than ordered through the official catalog of the IT department. Includes the application of personal devices at the workplace, some of which are: smartphones, notebooks, tablets, pen drives, etc.	Rentrop and Zimmermann (2012); Silic and Back (2014); Zimmermann, Retrop and Felden (2014); Gozman and Willcocks (2015), Huber et al (2016).

In their research, Silic and Back (2014) asked about the details of the software identified as illegal and unapproved, and the majority of the organizations listed productivity (e.g., Google apps) and communication software (e.g., Skype). Thus, the authors found that Skype, Google Talk, and Facebook video calling are the three main applications used by employees to communicate and collaborate at work.

Accordingly, we propose that Shadow IT can facilitate knowledge sharing in organizations. To investigate this proposition, we applied a qualitative method to analyze how knowledge sharing occurs through Shadow IT, which is described in the next section.

3. Research Method

The method used for research was an exploratory study based on a qualitative approach. This sort of research is conducted when the subject is relatively unknown. Shadow IT is a currently misunderstood and relatively unexplored phenomenon (Slick and Back, 2014). Moreover, we could not find any research that relates Knowledge Sharing and Shadow IT. Therefore, an exploratory study is necessary since Shadow IT is a new topic and its relevance to managers and the importance of Knowledge Sharing to companies are continuously increasing.

Qualitative data were collected through interviews with IT users, with the aim to gather respondents' perceptions concerning knowledge sharing through Shadow technology. The technique used for data collection was an interview guide with open questions, based on the research literature. The interview guide was composed of three main parts: 1) the type of Shadow IT the employee uses, 2) knowledge sharing via SIT (knowledge donation and collection), and 3) the benefits of knowledge sharing via SIT. A Ph.D. professor in Knowledge Management and an IT expert proofread the interview guide in order to validate the questions.

Since Shadow IT is a behavioral phenomenon that arises from the employee, research focused on the individual. Thus, we performed interviews with ten IT users from different companies. The selection of the respondents was made, based on the following criteria: the individual should have a formal job in a company, be an IT user, and use Shadow IT to perform tasks at work, all of which was verified through investigation prior to performing the interview. The interviews were conducted in the period November 2 – 15, 2015, with an average duration of one hour. Table 2 displays the respondents' profiles.

Table 2: Respondents

Respondents	Respondent's job title	Company's sector	Time working with current company	Code
Respondent 1	Sales Executive	Publishing Industry	3 months	R1
Respondent 2	IT Analyst	Transportation Sector	8 years	R2
Respondent 3	Consultant	Consulting	1 year and 8 months	R3
Respondent 4	Legal Advisor	Public sector	1 year and 3 months	R4
Respondent 5	IT Analyst	Public sector	6 years	R5
Respondent 6	Administrative assistant	Education Sector	1 year and 8 months	R6
Respondent 7	Marketing Analyst	IT Industry	2 years	R7

Respondent 8	IT Analyst	Bank Industry	2 years	R8
Respondent 9	Salesperson	Commerce	20 years	R9
Respondent 10	Account manager	Bank Industry	3 years	R10

Data analysis was based on all the sources of information used in the data collection stage, such as interviews, observations, and notes, taking into account theories and concepts that support the topic. Content Analysis was the data analysis technique applied to this research because it easily detects the presence or absence of predefined variables (Oliveira, Maçada and Goldoni, 2009). Content Analysis consists of a set of techniques to analyze communication in order to obtain indicators (quantitative or otherwise) that infer knowledge concerning the conditions of producing/receiving messages (Bardin, 1977). According to Dubé and Paré (2003), exploratory research must define a priori the constructs so as to help make sense of occurrences, ensure that important issues are not overlooked, and guide the interpretation and focus when conducting theory-building research. Following this orientation, data codification was made a priori based on the literature review.

4. Results

The results are reported according to the three main parts of the interview guide: 1) the type of Shadow IT the employee uses, 2) knowledge sharing via SIT (knowledge donation and collection), and 3) the benefits of knowledge sharing via SIT.

4.1 Types of Shadow IT Used by Employees

The first part of the interview guide aimed to discover what types of SIT employees use at work, based on the three SIT types of the literature review. Table 3 summarizes the Shadow technology used by the respondents and their organizational context in relation to SIT.

Table 3: Types of SIT Used by Respondents

SIT Type	Respondents	Context
Cloud services Salesforce, WhatsApp, Facebook, LinkedIn, Google Drive, Box (Microsoft), Skype, Telegram	R1, R2, R3, R4, R6, R7, R8, R9, R10	R1: Uses Facebook and LinkedIn mainly to look for costumers' information and share that via WhatsApp and Salesforce. Salesforce was adopted by Commercial department with no permission and no support from IT department. Salesforce gathers all information about company's sales and its clients in one place, which can be accessed by all employees from Commercial department. The company pays for Skype for Business but does not encourage employees to use it. R2: Uses Google Apps, but it is not an official solution. Uses a Control spreadsheet to gather information about projects (project deadlines, who performs each task, details about what should be done, etc). This solution provides user with mobility to create and store content via company computer and personal devices. Organizational e-mail is the company's official solution for communication. R3: Personally adopted Box (Microsoft) and uses it to create and store content, also serves as a backup solution to official system. Company's official solution is Google Drive. Organizational e-mail is the company's official solution for communication. R4: Uses WhatsApp since official communication software for sending instant messages provided by organization does not work efficiently, either messages take too long to arrive or fail to deliver. R6: Uses WhatsApp via personal smartphone (web version of WhatsApp as well) and Facebook via company computer. However, the official system to communicate with co-workers is through organizational e-mail. There is no instant messaging software provided by company. R7: Skype is not included on the list of authorized software. The

		organization's official communication system is Link (Microsoft). However, user needs to talk to customers and external partners who do not use Link. Therefore, user adopted Skype, with no IT approval and support, because it is a more commonly used tool. R8: Accesses WhatsApp and Telegram through personal smartphone. The web version of WhatsApp through company computer. Organizational e-mail is the official way of communication. There is no instant messaging software provided by company. R9: Accesses WhatsApp and Skype through personal smartphone. Official way of communication employed by organization is organizational e-mail. There is no instant messaging software provided by company. R10: Accesses WhatsApp through personal smartphone to speak with co-workers (including the head of business unit) and with clients. Organizational e-mail is the official way of communication. There is no instant messaging software provided by company.
Solutions developed or installed by employees Instant messaging software called Pidgin	R5	R5: Installed instant messaging software called Pidgin on company computer. Company has official instant messaging software, similar to a social network, and is the official means of communication at work. However, it is not efficient, because it is very heavy and slow to use, so it is not used at work.
Employee-owned devices smartphone, Pen drive	R1, R3, R4, R6, R8, R9, R10	R1: Salesforce and other apps are also accessed via personal smartphone. R3, R4, R6, R8, R9, and R10: Use personal smartphones to access apps such as WhatsApp and Facebook to communicate with co-workers with no formal BYOD politics.

As can be seen in Table 3, all respondents reported that they use some sort of communication or content sharing system at work, mostly cloud-based solutions. Six respondents access these systems through their own smartphones.

All of the respondents cited organizational e-mail as one of the official systems of communication. Moreover, four respondents reported organizational e-mail as the only official system for communication at work as the company does not provide instant messaging software.

4.2 Knowledge Sharing Through Shadow IT: Donating and Collecting Knowledge

The second part of the interview concerned knowledge sharing through Shadow IT. We divided the questions in two groups: donation and collection of knowledge.

When asked if they tell their co-workers when they learn something new and if they share information they have with their colleagues through SIT, nine respondents reported that they use SIT to share that knowledge. "You must share. Otherwise, the work will not go on, and you'll have an activity overload" (R6). Furthermore, context is a determinant. Citing R7, "I need to talk with clients and partners, so when I must share something with someone outside the company, we are dependent on Shadow IT."

Respondents six through ten reported that they usually tell their co-workers what they are doing using SIT. "Yes. It's not just telling them. It's a matter of aligning our work activities," said R5. Likewise, R4 explained, "I do not talk about everything I am doing, but when I have something new to share (like a non-routine process), I share it with my colleagues."

With regard to knowledge collection through SIT, the respondents claimed using shadow systems less frequently for asking co-workers when they need to learn something new or obtain some knowledge.

However, the respondents signaled some specific situational features for sharing knowledge through SIT. R1 explained, "Yes, I share a lot. The company encourages collaboration and knowledge sharing; it must. So, I also share via Shadow IT. But that depends on the profile of the information. The rule is what is fastest and objective. It does not depend on the cruciality of information". This

sense of urgency appeared very often in the respondents' statements. "Through SIT, communication is less formal and becomes more agile," said R3. Other situational features that impel employees to use SIT include when they judge some knowledge as relevant to co-workers, and neither they nor their co-workers are in the same place (geographical dispersion).

Regarding the type of knowledge (technical or managerial), employees donate and collect both types through SIT. It depends on the respondent's job profile, whether their tasks are more technical or managerial, and the current phase in which they find themselves in the work process. "Both types. It depends on the moment that we are in a particular process. When we are in the middle of an activity, it is technical. When the activity has not yet started, it is more managerial, to organize the activities," stated R5. The frequency with which employees use SIT to share knowledge varies from daily to twice a month.

4.3 Knowledge Sharing Through Shadow IT: Respondents' Perceptions of the Benefits

The third part of the interview guide served to know about the respondents' perceptions of the benefits of knowledge sharing through Shadow IT. Below, we observe the questions we asked the respondents to answer.

1) Why do you use SIT to communicate and exchange knowledge with your co-workers, clients, or external partners?

We identified similar categories in the respondents' answers. First, it is important to note that most respondents compared Shadow IT to organizational e-mail, since this is one of the most common official systems for communicating and content sharing with co-workers for many organizations.

The following words appear very often in the respondents' answers: instantaneous, agile, faster, dynamic, immediately, practicality, and speediness of information. Therefore, the sense of urgency seems to be the most important aspect that drives employees to use Shadow IT to communicate and exchange knowledge at the workplace, as cited by nine of the ten respondents.

In addition, geographic dispersion was cited by seven respondents as a reason to use SIT. The following situations cause this geographic dispersion, as reported by the respondents: incompatibility of schedules among co-workers; the company has other physical units; some employees have to speak with external partners frequently; and some employees can be with clients and, consequently, outside the workplace. The need for fast communication, especially in the context of geographic dispersion, drives employees to utilize more instantaneous and dynamic systems such as WhatsApp and Skype.

2) In your opinion, does Shadow IT facilitate knowledge sharing?

As reported above, most systems cited as Shadow IT by the respondents are collaborative systems such as instant messaging software, which provide them with faster and more dynamic communication. Given this fact, nine respondents believe that Shadow IT can facilitate knowledge sharing, since most of the Shadow systems they use (see Table 3) are communication and content sharing software. Employees obtain knowledge almost instantaneously by using these systems.

"Yes, for sure. In our context, we need to use SIT to continue activities because our tasks are based on communication with clients and external partners. Knowledge Sharing depends on good communication. People need to understand each other, so we need a communication channel that offers fast communication. If I were to explain a job only through e-mail, I would take a week to complete the task. Using Skype, I do it in one hour, so I have greater productivity," explained R7.

4.4 Discussion

With regard to the types of SIT, we identify that most Shadow IT used by the respondents are, in fact, collaborative tools such as communication and content sharing solutions, thus collaborating with the findings of Silic and Back (2014). The respondents reported that these Shadow systems provide them with agility and faster communication in response to a higher sense of urgency.

Existing literature suggests that there are several differences among the needs of departments and the solutions provided by IT (Fürstenau and Rothe, 2014; Haag and Eckhardt, 2015; Rentrop and Zimmermann, 2012; Silic and Back, 2014). We found that eight respondents use SIT either because the company does not provide suitable communication software or because it does not encourage employees to use the system provided by the IT department. Two respondents cited that their company provides instant messaging software but that it does not work efficiently. Five respondents reported that organizational e-mail is the only official solution for communication and that no instant messaging software is provided by the IT department. Moreover, one respondent commented that the company does not stimulate the use of the instant messaging software provided and supported by the

IT department. So, it may be inferred that organizations frequently do not provide employees with suitable tools to perform their work tasks, which then leads them to use SIT.

The development of tools such as smartphones and tables that quickly and easily access other systems (Silic and Back, 2014) corroborate with SIT use. We found that seven respondents use their own smartphones to access systems like WhatsApp and Skype to communicate faster with their co-workers.

According to the respondents, SIT provides faster communication and systems that make content sharing easier. Therefore, we argue that Shadow IT facilitates knowledge sharing. The literature supports the result. Maki-Komsi, Poyry, and Ropo (2005) suggest that factors such as the communication of required information and the agility of the tools in use contribute to successful knowledge sharing. Moreover, Ipe (2003) argues that technology-based systems that facilitate speedy knowledge sharing and better connections among individuals within the organization stimulate employees to share their knowledge.

Existing literature also suggests that individuals are more likely to share knowledge with others through informal interactions than through the use of formal systems (Ipe, 2003). The respondents frequently compared SIT with organizational e-mail, classifying the latter as a more formal way of communication and, as a consequence, less dynamic and agile. The respondents also reported the lower sense of urgency through e-mail. Therefore, Shadow IT acts, at least, as a supporting tool that facilitates and speeds up knowledge sharing.

5. Conclusion

Previous studies identify that collaborative software often appears as Shadow IT. Considering increased SIT use in the organization and the importance of knowledge sharing in the knowledge management process, this paper analyzes how knowledge sharing occurs through Shadow IT.

Like Davison, Ou, and Martinsons (2013), our research reinforces the importance and prevalence of informal and decentralized KS within organizations. We found that several collaborative software and mobile devices are used by employees without IT permission and support. The most common shadow systems are WhatsApp and Skype, as well as solutions to store and share content, e.g., Google Drive. Since these systems provide faster and dynamic communication, Shadow IT can facilitate knowledge sharing, particularly when people are geographically distributed. As a result, employees obtain the knowledge they need almost instantaneously. In addition, several employees use a Shadow system primarily because organizations do not provide suitable tools for effective communication.

This paper has theoretical and practical implications. For the academic community, our contribution is to expand current knowledge about Shadow Information Technology since it is a currently misunderstood and relatively unexplored phenomenon (Slick and Back, 2014). The practical implications encompass two relevant topics for the organization: to improve knowledge sharing and to manage Shadow IT. Our paper can aid IT managers in dealing with SIT and balancing the risks and benefits from this phenomenon. Furthermore, our research offers insight into knowledge sharing in the organization and how its importance in the knowledge management process can be facilitated by Shadow technologies.

Although one major issue for firms is finding a balance between sharing and protecting knowledge, KM literature has thus far tended to concentrate on the facilitation of knowledge sharing rather than on knowledge protection (Manhart and Thalmann, 2015). With this in mind, our suggestion for future research is to investigate whether the benefits of Shadow IT usage to knowledge sharing compensate the risks related to it, such as the risk to Knowledge Protection, since Shadow IT usage is frequently related to Security Information risk in the literature.

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