

Association for Information Systems AIS Electronic Library (AISeL)

ECIS 2014 Proceedings

ON THE EMERGENCE OF SHADOW IT - A TRANSACTION COST-BASED APPROACH

Stephan Zimmermann

HTWG Konstanz - University of Applied Sciences, Konstanz, Germany, stephan.zimmermann@htwg-konstanz.de

Christopher Rentrop

HTWG Konstanz - University of Applied Sciences, Konstanz, Germany, christopher.rentrop@htwg-konstanz.de

Follow this and additional works at: <http://aisel.aisnet.org/ecis2014>

Stephan Zimmermann and Christopher Rentrop, 2014, "ON THE EMERGENCE OF SHADOW IT - A TRANSACTION COST-BASED APPROACH", Proceedings of the European Conference on Information Systems (ECIS) 2014, Tel Aviv, Israel, June 9-11, 2014, ISBN 978-0-9915567-0-0
<http://aisel.aisnet.org/ecis2014/proceedings/track15/11>

This material is brought to you by the European Conference on Information Systems (ECIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2014 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

ON THE EMERGENCE OF SHADOW IT – A TRANSACTION COST-BASED APPROACH

Complete Research

Zimmermann, Stephan, HTWG Konstanz - University of Applied Sciences, Konstanz,
Germany, stephan.zimmermann@htwg-konstanz.de

Rentrop, Christopher, HTWG Konstanz - University of Applied Sciences, Konstanz,
Germany, christopher.rentrop@htwg-konstanz.de

Abstract

Information Technology (IT) used for business processes is not only provided by the organization's IT department. Business departments and users autonomously implement IT solutions, which are not embedded in the organizational IT service management. This increasingly occurring phenomenon is called Shadow IT. The various opportunities and risks of Shadow IT challenge organizations and call for approaches to manage the phenomenon. An initial point to achieve measurable indications for the management is to explain why Shadow IT emerges. Therefore, this paper explores the business decision to implement Shadow IT. Based on existing research we derive that Shadow IT is created after a make-or-buy decision, which is substantiated in the Transaction Cost Theory. We deploy a triangulation approach using the methods expert interviews and multiple-case study to investigate Shadow IT emergence. Our findings identify prohibitive transaction costs in the exchange relation between business and IT departments, influenced by misalignment, as the main explanation. We conclude that the principles of Transaction Cost Theory may be applied to develop governance structures for managing Shadow IT. This strengthens the link between IT Governance and Business IT Alignment and expands the understanding of business integration within the IT domains of an organization.

Keywords: Shadow IT, Transaction Cost Theory, IT Governance, Business IT Alignment.

1 Introduction

Practitioner studies show that two-thirds of IT managers acknowledge "Shadow IT" as an existing phenomenon in their organization (Smyth and Freeman, 2007; Chejfec, 2012). A reason is that IT used for business processes is not only provided by the organization's IT department. Besides formal solutions, business departments and users implement IT autonomously. End user computing tools (Brancheau and Brown, 1993) and knowledge workers (Drucker, 1999) have facilitated a development of individual solutions for many years. Different factors drive this evolution and increase the relevance. The attitude of employees has changed towards an emancipated handling of IT. Digital natives and immigrants (Prensky, 2001) are tech-savvy and transfer IT expectations from their private life into their workplace. New web-based technologies provide easy access to solutions. The resulting Shadow IT causes various effects (Behrens, 2009). The shadow solutions promise flexibility for the business and may leverage innovations. However, several risks, e.g. in security and compliance, or

inefficiencies may occur. Information Systems (IS) research has begun to address the phenomenon in the domains of IT Governance and Business IT Alignment (BITA) (Györy et al., 2012). To realize opportunities and to minimize risks, research and practice processes aim to control Shadow IT. Therefore, the development of measurable indications for its management should be possible. A considerable initial artefact to achieve this is the characterisation of attributes of the emerging phenomenon of Shadow IT. For this reason, the goal of this paper is to explore the business decision on how to fulfil IT needs, which allows drawing an overall concept to explain Shadow IT emergence.

Prior research has analysed opportunities and risks of Shadow IT (Behrens, 2009). Most existing publications particularly try to explain its emergence by focusing on the environment of Shadow IT (Behrens and Sedera, 2004; Györy et al., 2012) or investigate special issues with minor relevance to the overall phenomenon (Spierings et al., 2012; Ortbach et al., 2013a). The analysis of existing Shadow IT on a broad empirical basis is missing. Regarding IT Governance approaches to control Shadow IT, research offers fundamental orientations (Györy et al., 2012). However, theory-based mechanisms to implement them do not exist. This research contributes to the discussion on explaining emerging Shadow IT and introduces an approach based on Transaction Cost Theory (Williamson, 1975). This delivers a practical basis to control Shadow IT and extends IT Governance research.

The paper proceeds as follows: After discussing the status quo in Chapter 2, we present Transaction Cost Theory as the background for the interpretation of our study and outline our research methods in Chapter 3. The realization and the results of these methods are presented in Chapter 4. In Chapter 5 we discuss the triangulated results and IT Governance implications. The last chapter summarizes the paper's insights and provides suggestions for future research.

2 Status Quo

Opportunities and risks of IT solutions developed by end users have been under consideration since the 1980s. At this time companies consciously started to transfer small scale development tasks from the IT department to the end users to overcome resource obstacles (Rockart and Flannery, 1983; Alavi et al., 1988). End user computing research focuses on technological and organizational components (Brancheau and Brown, 1993; Barker and Fiedler, 2011). In this approach, management is fully aware of the activities and supports them as an integral part of the IT service strategy (Ferneley, 2007). However, besides the intended concept, departments and users also deploy solutions without the awareness of management (Ferneley, 2007; Gerrity and Rochart, 1986) and on a bigger scale than management intended. This can be characterized as *Shadow IT*.

Equivalent keywords used in literature for *Shadow IT* are *shadow systems*, *feral systems*, *grey IT*, *rogue IT* and *hidden IT*. In order to systematically identify the status quo of peer-reviewed research in this field (Webster and Watson, 2002), we queried several academic databases (Ebscohost Business Source Complete, ScienceDirect, ProQuest, IEEE Xplore, ACM Digital Library, AIS Electronic Library, Jstor), IS journals (based on AIS senior scholars' basket) and proceedings of established IS conferences (ACIS, AMCIS, ECIS, HICSS, ICIS, PACIS) using the named keywords in combination with *information technology*, *information services*, *information systems* and *information security*. In the first step we limited the search to abstract, title and keywords. Relevant papers out of 32 initial hits were selected and duplicates were removed. A total of 16 publications remained. Finally, we conducted a backward- and a forward-search to avoid missing references (Webster and Watson, 2002). Aiming at a better understanding on the emergence of Shadow IT we focused on practical examples described in prior research. As only few concrete examples could be identified in the remained papers, we expanded the search for the named keywords in a second step to a full text search. After removing non-relevant hits and duplicates, we filtered out practical cases and recorded them in a database. With this process overlapping situations occurred where some papers describe several examples and some examples are described in different papers. In total we could identify 36 examples from 30 papers.

2.1 Shadow IT Phenomenon

Shadow IT supports business processes and tasks. In contrast to formal solutions, which are registered in the asset and configuration management and planned within the service portfolio (van Bon et al., 2007), Shadow IT is usually not embedded in the organizational IT service management. This differentiation leads to the following definition¹ (Zimmermann and Rentrop, 2012): "The term Shadow IT describes business process supporting IT systems, IT service processes and IT staff. They are deployed autonomously within business departments and by IT users. Thereby, Shadow IT entities are involved neither technically nor strategically in the IT service management of the organization, and therefore, neither included in the asset and configuration management nor in the service portfolio." Typical Shadow IT occurrences are application programs, spreadsheet and desktop database solutions, cloud services, mobile devices, hardware equipment, support structures, or a combination thereof.

Scientific work on Shadow IT has increased in the recent decade. Contributions focus on occurrences (Shumarova and Swatman, 2008; Walters, 2013) and effects (Behrens, 2009; Györy et al., 2012; Silvius and Dols, 2012) of Shadow IT. Many of them refer to the response of users to new Enterprise Systems (ES) (Scott and Wagner, 2003; Behrens and Sedera, 2004; Jones et al., 2004; Boudreau and Robey, 2005; Houghton and Kerr, 2006; Kerr et al., 2007; Kerr and Houghton, 2008; Behrens, 2009). These publications describe shadow systems, which circumvent the organizational ES. Few papers can be found on how to manage Shadow IT (Györy et al., 2012; Rentrop and Zimmermann, 2012).

2.2 Shadow IT Emergence

Several studies describe a connection between Shadow IT and BITA. BITA in an organization states the ability to fulfil and dynamically harmonize business strategies, goals and needs with IT capabilities (Henderson and Venkatraman, 1993; Luftman, 2000). Organizations aim for a mature BITA (Luftman, 2000). Achieving this requires, inter alia, a well-functioning relationship between business and IT departments (Luftman, 2000). Behrens and Sedera (2004) work out gaps between the IT needs of the business and the provided Enterprise System which can be filled by shadow systems. Based on a case study in a university they observed organizational, individual and technological conditions influencing these gaps after an ES implementation. A large gap and intervening conditions like the availability of resources and user expertise encourage shadow systems (Behrens and Sedera, 2004). Other authors define these gaps as a misalignment (Jones et al., 2004) resulting from "the relational, strategy and structural detachment of IT and business" (Györy et al., 2012). Misalignment, which can influence Shadow IT, mainly occurs in situations of inadequate functionalities of the ES (Jones et al., 2004), insufficient organizational flexibility (Behrens and Sedera, 2004), long implementation time and high initial costs of new formal solutions (Györy et al., 2012) and missing involvement of business people during formal IT implementations (Györy et al., 2012).

Based on the identified examples in literature, several arguments for the decision to implement Shadow IT can be found. Although many actual reasons for the emergence of these examples are partially connected to misalignment, the decision in favour of Shadow IT seems to be finally triggered by more specific reasons within the relationship of business and IT. For the identified examples, departments and users describe hurdles in addressing the IT department regarding ideas or IT needs due to assumed time delays (Craig, 1999; Behrens and Sedera, 2004; Wagner et al., 2011; Niehaves et al., 2013), assumed communication and complexity costs (Kumar et al., 2003; McAlearney et al.,

¹ An appropriate and differentiating definition of Shadow IT is missing in English literature. Therefore, a translated definition from a German-speaking reference had to be used in this paper, which expands the identified literature on the phenomenon.

2010), or unpleasant experiences from the past (LeFave et al., 2008; Berente et al., 2008; Scott and Wagner, 2003). In these situations the examples show that the implementation of Shadow IT is easier, faster, more flexible and allows a quick reaction to ad-hoc or non-routine issues (Graham, 2002; Houghton and Kerr, 2006; McAlearney et al., 2010; Beimborn and Palitza, 2013).

Kerr et al. (2007) describe power tensions as a further impact factor on Shadow IT. In their single case study, they analysed the reaction of users to an ES implementation where the operational departments wanted to gain back control and built shadow systems (Kerr et al., 2007). Based on these findings, Spierings et al. (2012) developed a power-based approach following Structuration Theory (Giddens, 1979) and the concept of knowledge workers (Drucker, 1999), who are able to wield power from the bottom of hierarchical structures by using information and knowledge (Spierings et al., 2012). Based on this and by analysing three shadow systems, Spierings et al. (2012) show different stages of how users reacted to losses of productivity and control, which arose from a poor fit of a new ES to local needs. Users without sufficient skills to develop IT solutions autonomously can only submit to or dismiss the new ES (Askenäs and Westelius, 2000). However, users with sufficient skills may develop Shadow IT to circumvent the ES to compensate for their personal loss of productivity and control. If they have low influence, they will do this only in hidden form. In contrast, if they have high influence or are supported by a senior executive with hierarchical power, they will operate in open defiance. Similarly, Thatte et al. (2012) describe power and resistance to policies leading to Shadow IT in their model of structural strain. Summing up these findings and referring to examples in literature (Behrens and Sedera, 2004; Morton, 2006; Kerr et al., 2007; Spierings et al., 2012), power-based aspects of departments to gain back control provide another explanation for Shadow IT emergence.

Another approach explaining Shadow IT emergence can be found in the debate on IT consumerization (Harris et al., 2012), driven by the individualization of IS (Ortbach et al., 2013a; 2013b). On a macro level, IT consumerization describes “the trend of adopting technologies originally developed for the consumer market for professional use in enterprises” (Ortbach et al., 2013a). This includes formal adoption of consumer IT, but also informal adoption in terms of Shadow IT (Ortbach et al., 2013a). On a micro level, Ortbach et al. (2013a) define "consumerization behavior of an individual as the usage of technologies from the private (or dual-use) space for business purposes". Based on the unified theory of acceptance and use of technology (Venkatesh et al., 2003) and its extension to consumer usage behaviour (Venkatesh et al., 2012), several quantitative studies (Ortbach et al., 2013a; 2013b; Loose et al., 2013; Dernbecher et al., 2013) show why users choose consumer IT in their work life. In case of an informal adoption, these studies also offer insights into the emergence of Shadow IT. The study results show that the performance expectancy (Ortbach et al., 2013a; Loose et al., 2013) and the habits (Dernbecher et al., 2013) of individuals are significant for their behavioural intention to use consumer IT for business purposes. Furthermore, the identification with devices or solutions (Loose et al., 2013) and social influences (Ortbach et al., 2013a; 2013b) contribute to this intention. Referring to these studies and identified Shadow IT examples from literature (Boudreau and Robey, 2005; Berente et al., 2008; McAlearney et al., 2010; Houghton and Mackrell, 2012), individual behaviour-based aspects explain the decision of users to implement Shadow IT.

| | Hits | Relevant | Duplicates | Results | with examples | No. of examples |
|---|--|---|------------|---------|---------------|-----------------|
| Title/Abstract/Keywords (T/A/K) | 32 | 20 | 4 | 16 | 12 | 17 |
| Full text (without T/A/K) | 440 | 48 | 4 | 44 | 18 | 19 |
| Total | 472 | 68 | 8 | 60 | 30 | 36 |
| Academic Databases: Ebscohost, ScienceDirect, ProQuest, IEEE Xplore, ACM, AIS Electronic Library, Jstor | Potential explanation for Shadow IT emergence: | Not enough information | | | 18 | |
| | | Power | | | 5 | |
| | | Individual behaviour | | | 5 | |
| | | Assumed hurdles in business IT relation | | | 14 | |

Table 1. Results from literature search on practical Shadow IT examples

Table 1 presents the prior research on concrete examples in practice and potential explanations for their emergence. Thereby, 18 Shadow IT examples are not described with detailed enough information and focus rather on their existence or subsequent effects (Shumarova and Swatman, 2008; Walters, 2013; Wagner and Newell, 2005; Huuskonen and Vakkari, 2013). Moreover, the results show that potential explanations are not necessarily disjoint. Power-based reasons, individual behaviour-based reasons and hurdles in the business IT relation can influence the decision in favour of Shadow IT simultaneously (Behrens and Sedera, 2004; McAlearney et al., 2010; Spierings et al., 2012).

2.3 Summary and Research Question

Despite the growing discussion regarding Shadow IT, research is in its infancy towards understanding the phenomenon. So far, empirical studies on Shadow IT have been primarily based on few concrete examples. Furthermore, the identified practical examples are usually not the main focus within the studies and are only described on a thin information base without concentrating on the reasons for their emergence. This is because most studies concentrate on user reactions to newly implemented ES and the role Shadow IT plays as one of several possible consequences. Moreover, many contributions deal with universities as objects of study (Scott and Wagner, 2003; Behrens, 2009), which represent special types of institutions. Studies with a broad database covering several practical Shadow IT examples in typical work environments within economic institutions are missing.

Important progress in research has been made regarding the connection of Shadow IT, alignment and IT Governance. Shadow IT indicates misalignment and an operational solution for it is offered (Györy et al., 2012). Addressing Shadow IT in the domain of IT Governance enables the achievement of a higher level of alignment maturity (Györy et al., 2012; De Haes and Van Grembergen, 2008). However, misalignment seems to merely describe one driving factor for the emergence of Shadow IT, other arguments in this context point at more specific reasons within the relationship of business and IT. To progress in the question of possible governance mechanisms, it is of interest to have a closer look at the decision of business departments and users in favour of Shadow IT.

Some theory-based explanations for this issue have been developed based on power and individual behaviour aspects as previously discussed. In fact, both approaches refer to special issues. The power aspect focuses mostly on the business reaction to the loss of control due to a new ES. The individual behaviour aspect regards consumer IT, which is only one of several possible Shadow IT occurrences. Hence it is necessary to investigate Shadow IT in economic institutions in a more general way.

As shown in prior research it is important to find a way to control the phenomenon. Derived from top management perspective, existing fundamental IT Governance orientations to manage Shadow IT are IT-control, user-oriented and user-driven approaches (Györy et al., 2012). The challenge is to implement these general orientations. To address this, a theory-based explanation on the major causes of emerging Shadow IT is essential. Thus, we intend to answer the subsequent research question:

Why do business departments and users decide to implement Shadow IT, instead of referring to existing formal IT structures?

Following this question we now present the further theoretical background and the applied methods. Based on this and the status quo we interpret subsequently explored data from literature and practice.

3 Research Approach

This chapter describes the theoretical background of our research to be able to interpret our subsequent study results. We introduce Transaction Cost Theory and demonstrate why this theory is worth consideration in the attempt to explain emerging Shadow IT. Furthermore, we present the methods applied in the study and show why these are appropriate to answer the research question.

3.1 Theoretical Background: Transaction Cost Theory

Prior research shows that Shadow IT emerges depending on the relationship between business and IT departments (Györy et al., 2012). In case of IT needs for business support, exchange processes between these two actors would normally lead to formal solutions. IT demand processes (van Bon et al., 2007) demonstrate this internal exchange relation: Business departments and users can trigger a transfer of IT services and capabilities from the IT department into the business processes. From an economic point of view, this exchange situation represents a transaction, as "a transaction occurs when a good or service is transferred across a technologically separable interface. One stage of activity terminates and another begins." (Williamson, 1985) From business department and user perspective, two possibilities arise if IT needs occur: organizing the implementation of the desired solution autonomously, or carrying out the transaction with the IT department using formal processes. This option describes a type of make-or-buy decision (Walker and Weber, 1984), which is theoretically substantiated in Transaction Cost Theory (Coase, 1937; Williamson, 1975).

Originally developed to explain why firms exist rather than just markets (Coase, 1937; Williamson, 1975), as a part of the new institutional economics, Transaction Cost Theory is also a valuable instrument to analyse transactions at an internal level of organizations (Williamson, 1985). The theory is based on the fact that transaction costs occur for the actors of economic exchange in addition to the production costs for the exchanged goods or services themselves (Coase, 1937; Williamson, 1975). These transaction costs refer to the processing and organizing of exchange (Williamson, 1985) in ex ante, e.g. for informing, drafting and negotiating before the conclusion of agreements and in ex post, e.g. due to subsequent changes or setup, running and monitoring tasks.

As stated above, the decision to implement Shadow IT represents a type of make-or-buy decision. This understanding implies that Transaction Cost Theory can be valuable to analyse the phenomenon. Existing research fails to consider this decision in the business IT relation. Besides the approaches in the status quo, we take this into account in exploring Shadow IT examples and their emergence.

3.2 Method

To understand underlying business decisions, we focused on existing Shadow IT examples. Since most research contributions only gather few examples, we decided to collect new practical data in a triangulation approach (Denzin, 2009) to build a broader analytical database. As Shadow IT refers to an organizational phenomenon with vague variables, we chose a triangulation of qualitative methods (Myers, 1997; Creswell, 2009). We therefore used expert interviews (Flick, 2009) to obtain examples from practice (Denzin, 2009) and conducted case studies (Yin, 2014) to gain additional insights into the subject on a more general level regarding organizations. By using a methodological triangulation we consider different perspectives, expand our argumentation basis and generate more reliable results (Denzin, 2009). To develop the empirical methods, we were able to rely on experiences of the authors (Flick, 2009). One author implemented several Shadow IT solutions on his own. The other author observed Shadow IT from an IT department perspective. Figure 1 illustrates the research process.

We decided to combine the methods due to several benefits and to compensate for weaknesses. By interviewing experts (Flick, 2009) we collected practical examples. Focusing on experts as individuals and their experiences allowed us to derive reasons for Shadow IT emergence on a single example-level. This method is appropriate as the knowledge of experts creates insights in a specific topic and helps to prepare further methods of a study (Flick, 2009). We have benefited from this method by asking directly about Shadow IT without organizational pressure as the participants from business were interviewed outside of the workplace. The method provided a basis for the case studies. However, we obtained no deep insight into the organizations themselves and into their BITA maturity.

We carried out case studies to explore Shadow IT implementations in the context of a more general organizational level. In order to strengthen our findings, we followed a multiple-case study approach, as specified by Yin (2014). The possibility of an in-depth analysis with different perspectives and the consideration of alignment maturity represent the benefits of this method. In contrast to the expert interviews, the weaknesses are that we were not able to ask directly about Shadow IT. Due to the negatively associated term and because the business interviewees might have circumvented policies and would not openly admit to this, we carried out a hidden inquiry.

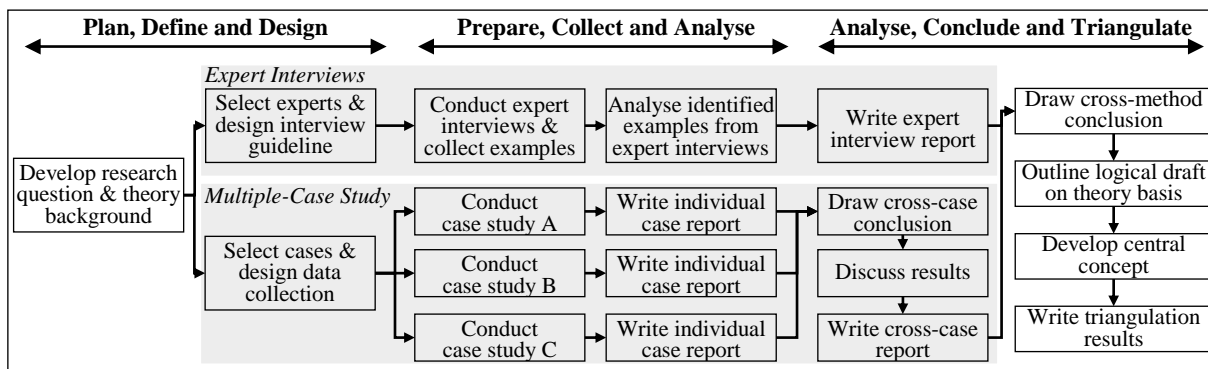


Figure 1. Research process: Triangulation method overview

4 Realization and Results

We used a range of companies and experienced informants to ensure that evidence covers a wide range of departmental views and different types of Shadow IT. The realization and the results of each method are presented in the following sections in detail. Afterwards we describe the triangulation of these results and the cross-method synthesis in Chapter 5.

4.1 Expert Interviews

We carried out face-to-face interviews with practitioners who were familiar with Shadow IT examples. We chose these experts based on a triangulation of data sources (Denzin, 2009). Therefore, we interviewed 7 business experts (2 department heads, 5 employees) who had experience and in-depth insight into the implementation of Shadow IT. Furthermore, we interviewed 10 IT experts (8 IT managers, 2 IT employees), who could describe Shadow IT instances that have been detected in their companies. The 17 interviewees worked for French, German and Swiss companies. To achieve comparison and identify recurring patterns (Yin, 2014) we selected interviewees from large multinational companies (1.350-275.000 employees) with formally implemented IT service management processes to distinguish Shadow IT from formal IT. We aimed at an adequate variation of industries (Number of companies per industry: 3 x Manufacturing, 3 x Automotive, 2 x Telecommunications, 2 x Pharmaceutical, 1 x Finance, 1 x Entertainment, 1 x Logistics, 1 x Marketing) and gathered Shadow IT examples from different departments. Participants were contacted directly, mostly at practitioner conferences. For the interviews we used a pre-tested, semi-structured guideline with open-ended questions (Myers and Newman, 2007) which addressed two key parts; the description of the examples and the reasons for their implementation. To ensure content validity, we clarified the understanding of the term Shadow IT at the beginning. The interviews were conducted between December 2011 and April 2013 and each lasted about 20–30 minutes, depending on the number of instances a participant was familiar with. The answers were logged by taking notes. We collected 39 examples at the point of saturation (Corbin and Strauss, 2008).

To analyse the data we followed the procedure proposed by Corbin and Strauss (2008) and coded all transcribed notes of each example (open and axial). Thereby, the initial splitting of data and the outlining of categories in open coding and the relating of the categories in axial coding went hand in hand (Corbin and Strauss, 2008). This analysis led to five categories related to Shadow IT emergence. Table 2 presents the categories, including the assigned elements in their relationship and code samples.

| Category | Code samples | Relationship element |
|---|---|-----------------------|
| Shadow IT implementation | <ul style="list-style-type: none"> • <i>Autonomous development</i> • <i>Own external sourcing / Own operation activities</i> | Phenomenon |
| Misalignment in the relation of business and IT | <ul style="list-style-type: none"> • <i>Missing/insufficient services, budget or know how in formal IT</i> • <i>No/long lasting IT request fulfilments</i> • <i>Historical/Cultural distance between business and IT</i> | Context |
| Prohibitive assumptions to address formal IT compared to an autonomous solution | <ul style="list-style-type: none"> • <i>Autonomous implementation is easier / faster</i> • <i>Bad experiences with IT department/projects/changes afterwards</i> • <i>Ad-hoc/small beginning of implementation in a prototyping way</i> • <i>Missing information about existing IT services and costs</i> • <i>No trust in formal IT services due to bad experiences</i> | Causal condition |
| Power aspects | <ul style="list-style-type: none"> • <i>Unauthorized implementation to gain control</i> • <i>Self-image and organizational autonomy in the business</i> | Causal side condition |
| Individual behaviour | <ul style="list-style-type: none"> • <i>Existing habit of the employee with the solution</i> • <i>Identity with the technology / the creative solution</i> | Causal side condition |

Table 2. Categories resulting from the analysis of the expert interviews

Business departments and users were driven by different elements to finally decide on the implementation of IT in an autonomous way. In 34 of the 39 analysed examples, misaligned situations built the fundament for Shadow IT. In all of these 34 examples the decision was influenced by an assumed cumbersome way to address formal structures. The shadow implementation seemed faster and did not require long negotiating time. This was also influenced by earlier experiences with the IT department regarding new IT needs. The category of prohibitive assumptions presents the main causal condition for the implementation of Shadow IT. Two side conditions reflect aspects of power and individual behaviour, which played a decisive role in 11 respectively 9 examples, 5 of them completely independent from a misaligned context. This explanation meets the status quo discussion. In total, 14 examples resulted from an overlapping of the described conditions. In most of these examples prohibitive assumptions combined with power or individual behaviour led to Shadow IT.

4.2 Multiple-Case Study

To facilitate theoretical and literal replication in the multiple-case study (Yin, 2014) we used a purposive sampling strategy. For comparison reasons and to identify recurring patterns we selected 3 large German and Swiss companies with formally existing IT service management processes to distinguish Shadow IT and formal IT. Within the cases we focused on different business processes and departments. We chose companies from various industries in different situations regarding their process stability to facilitate theoretical replication (see Table 3). Relying on our research question and theoretical background, the unit of analysis was the business decision to implement Shadow IT.

We conducted the case studies between July 2012 and June 2013. Each lasted between 3–4 months. During the collection of data we identified all process-related IT solutions, the formal and informal ones, and existing gaps in the IT support. This complete inquiry was necessary because of two reasons: First, as we chose a hidden identification of Shadow IT, we described the purpose of our study as an inquiry of IT architecture. Second, for further analysis, it was necessary to distinguish the decision to implement Shadow IT from the decision to request for formal IT solutions. Additionally,

we aimed at assessing the BITA maturity following the criteria of Luftman (2000), as an important point from prior research. We used data triangulation techniques by applying internal documents (process models, manuals), technical artefacts (software inventory tools, help desk reports), interviews with business and IT people and contextual observations as sources of evidence (Yin, 2014).

| | Indus-try | Em-ployees | Analysed Processes/Departments | Interviewees from | | Company Situation |
|---|---------------|------------|---|---|--|---|
| | | | | Business | IT | |
| A | Insur-ance | 1.300 | Benefits Statements: private & corporate clients | 2 department heads with detailed process experience | 1 IT manager with IT architecture experience | Established company, operating on a national level; stable processes |
| B | Engi-nee-ring | 47.500 | Order Management of a Manufacturing Unit (Sales, Con-struction, Production, Quality Management, Shipment) | 2 department heads with overall process experience; 3 employees with detailed background on the Shadow IT | 1 IT manager infrastructure, 3 IT project managers Core ES, 1 IT manager help desk | Long-established com-pany; part of a multi-national conglomerate; several restructuring projects in recent years. |
| C | Elec-tronics | 5.500 | Corporate Marketing (Digital Media, Corporate Design & Event Management) | 3 department heads with detailed process and Shadow IT experience | 1 IT project mana-ger with overall IT architecture experience | Multinational company with intense growth in last few years due to increased market demands. |

Table 3. Multiple-case study: Company profiles

After analysing the documents, we started the first round of interviews following pre-tested, semi-structured guidelines (Myers and Newman, 2007). Each interview lasted 1–2 hours. In the interviews with the IT departments, we checked our understanding of the companies’ processes and the formal IT architecture and investigated the status of BITA. The interviews with the business followed along the processes and aimed at the identification of all IT solutions and existing IT gaps. Interview data on Shadow IT was rarely in line with internal documents as Shadow IT is not formal. A better consistency existed with results from applied technical artefacts such as computer scans on installed software or analysed help desk service tickets on unknown solutions. By working out the differences to the analysed formal architecture, we could determine instances of Shadow IT. Based on this, we concentrated on the reasons why solutions were implemented autonomously or by addressing formal IT. Furthermore, we focused on the BITA maturity. In a second round of brief interviews, we verified our picture of existing IT solutions and the collected data. Based on our transcribed protocols, we finally discussed the study report with the departments involved and recorded our overall observations.

We analysed each case study following the preceding argumentations in the status quo and the theoretical background (Yin, 2014). Assessing the maturity of alignment (Luftman, 2000) was the first step in this analysis. Then, we focused on the make-or-buy decision from a business perspective whether or not to implement Shadow IT. In contrast to this, we also examined the path to implement formal IT solutions and existing IT gaps. The analysis of each case study led to individual results. Finally, we conducted a cross-case conclusion based on these results (Yin, 2014) to achieve insights into the explanation of Shadow IT emergence on a general, organizational level.

The analysis reveals different insights into the implementation of Shadow IT. Table 4 presents the results of each case study. Based on these, the cross-case synthesis confirms the connection of BITA and Shadow IT. Although we might not have found all shadow entities in each study, a mature state of BITA points to less Shadow IT. This argument is supported by the ratio of Shadow IT to all identified solutions. Of course, the presented numbers also include less relevant Shadow IT entities and are compared with formal core solutions such as comprehensive ES. Nevertheless, this argument provides useful insight into the relation of Shadow IT and misalignment. However, in contrary direction, case A showed that even situations with an excellent state of BITA cannot prevent Shadow IT completely.

| Shadow IT | Individual case study results |
|--|--|
| A 6 solutions (15% of all IT solutions in the process) | <ul style="list-style-type: none"> • High level of Business IT Alignment (BITA) maturity • Some small Shadow IT solutions filling small gaps in the formal IT offer • Shadow IT (SIT) mostly started with ad-hoc solutions to organize work or for rarely occurring business specific requirements. Autonomous implementation seemed faster • In case of highly assumed efforts to fulfil needs, formal IT was requested or gaps remained |
| B 52 solutions (57% of all IT solutions in the process) | <ul style="list-style-type: none"> • Historically organizational distance of business and IT: Low level of BITA maturity • Many SIT solutions in addition to the Enterprise System provided by the IT department • SIT started small (prototypes of ideas), some led to large solutions • Addressing central IT seemed too time-consuming and costly (too complex/bad experience) • Missing know-how and transparency in the IT department. It was easier to buy external resources or to develop solutions autonomously • If fulfilling a need seemed too complex, formal IT was addressed or gaps remained |
| C 41 solutions (66% of all IT solutions in the process) | <ul style="list-style-type: none"> • Quick company growth with BITA harmonization in progress, but very slow: Poor BITA • Business specific SIT started because of time-to-market: addressing IT department seemed too costly and time-consuming concerning implementation, operation and changes • Due to existing expertise and resources autonomous implementation seemed cheaper • Only in case of highly assumed efforts, formal IT was requested |

Table 4. Individual case study results

The majority of Shadow IT implementations followed the business argumentation that "the way to address the IT department was too long" regarding time, costs, the transfer of requirements, or building expertise in the IT department. Several interviewees stated that "there have been some bad experiences in the past" with the IT department concerning "high and costly complexity in applying for solutions", "deferred requests" and "long delivery times" because of time or budget problems, "problems in changes or support after the implementation", or "no transparency in requesting and implementation". Departments and users "needed a fast implementation" because of "time-to-market reasons" or "ad hoc requirements", and to implement Shadow IT seemed easier. Sometimes they "just wanted to try an idea" or "started a casual but creative solution for a problem" in a prototyping way. These various assumptions about the efforts of contacting the IT department for a formal solution combined with assumed low initial costs for autonomous solutions led to Shadow IT. In some cases the decision to implement and especially not to handover a shadow solution to the IT department was based on individual interest ("we liked the idea of creating such a system") or based on power considerations of the responsible managers. Furthermore the interviews showed that in spite of misaligned situations IT needs were implemented by formal IT or not implemented at all. This happened when an autonomous solution was expected to be too complex regarding resources and expertise of the business department or the costs of a solution were higher than the expected benefits.

5 Discussion

Based on the described status quo and Transaction Cost Theory, we now combine the findings from the two sources and discuss the cross-method conclusion which leads to the resulting artefact of our research. Afterwards we discuss IT Governance implications with regard to our research contribution.

5.1 Triangulation of Results

Following prior research (Györy et al., 2012) we could prove the connection of Shadow IT and misalignment on a broader level of data. However, the results from cases B and C show that Shadow IT does not compulsively follow IT needs in misaligned situations. Besides Shadow IT, also formal IT solutions are requested or IT needs remain as IT gaps. On the other hand, a mature BITA level does

not prevent Shadow IT. Independent from misalignment, the study results confirm power- or individual behaviour-based implementations of Shadow IT as illustrated in prior research (Spierings et al., 2012; Ortbach et al., 2013a). However, these explanations are not representative of the majority of Shadow IT instances. Findings from expert interviews and case studies highlight arguments in terms of make-or-buy decisions. The results reveal assumptions from business perspective that prevent the occurrence of a productive exchange with the IT department possibly resulting in a formal solution. These assumptions follow, e.g., on earlier experiences or missing information on relevant parameters for an exchange. These hurdles before a potential internal exchange and expected adjustments afterwards can be placed on a level with ex-ante and ex-post transaction costs (Williamson, 1975). Thus, transaction costs may prohibit (Williamson, 1979) the initiation of formal IT and lead to the business decision of implementing an IT solution autonomously in the form of Shadow IT.

Figure 2 illustrates this influence of transaction costs from the perspective of business departments and users. IT solutions are commonly expected to decrease production and transaction costs of business processes (Bakos and Treacy, 1986). To fulfil IT needs by implementing an IT solution instead of having no solution would therefore increase work performance and reduce these costs (A). Ongoing production costs to operate an implemented autonomous IT solution and the allocation of total costs for delivering and developing a utilized formal IT service decrease this reduction of process costs. Following the formal way to fulfil the IT needs implies that transaction costs occur in the exchange relation with the IT department (B). For an autonomous solution these transaction costs do not exist.

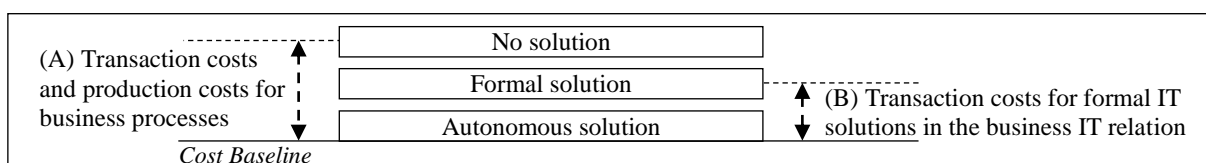


Figure 2. Transaction costs influencing the possible fulfilment of IT needs from a business view

As stated before, the study results clarify that misaligned situations influence Shadow IT. In relying on Figure 2, this implies that misalignment increases transaction costs for a formal solution. Conversely, a mature BITA keeps down these costs and reduces emerging Shadow IT, as formal IT structures are more likely addressed. However, an ideal state of BITA where all IT needs are continuously fulfilled is difficult to sustain (Cleven, 2011). During BITA harmonization processes occurring misaligned situations can drive emerging Shadow IT. In addition, as mentioned before, Shadow IT is no inevitable consequence of IT needs in misaligned situations. To explain this, the initial production costs (Williamson, 1981) for autonomous implementations need to be considered. Furthermore, derived from case study A, Shadow IT even emerges in situations with an excellent state of BITA. This results as transaction costs always exist and may prohibit exchange relations with the IT department. Thus, prohibitive transaction costs provide a more specific explanation for the business decision in favour of Shadow IT while misalignment solely poses an additional possible driver for the assumed costs.

The business decision to react to an IT need requires initially an assumed reduction of costs for the regarded business process by implementing an IT solution. According to our studies the assumed reduction differs for formal and autonomous solutions only in a few cases. Therefore, the decision in most cases only depends on the comparison of the above stated transaction costs for formal solutions and the initial production costs for Shadow IT. The analysed codes from the expert interviews and the findings from the case studies reveal that Shadow IT mostly starts in terms of small, ad-hoc, or prototyped solutions. Thus, business departments and users assume initial production costs to be low. The assumption is influenced by different intervening conditions such as expertise or access to resources, as shown in prior research (Behrens and Sedera, 2004; Spierings et al., 2012). This means, if business departments and users assume transaction costs for a formal IT solution to be higher than initial production costs of an autonomous solution, they decide to implement Shadow IT. Especially

the case study results show the situation if the business side assumes the transaction costs in the relation with the IT department to be lower than the initial production costs for Shadow IT. In these cases, formal IT structures are addressed to fulfil the IT needs. In the few cases where the assumed process cost reduction differs for formal and autonomous solutions, the net totals of the assumed reductions to the corresponding transaction costs respectively production costs are taken into consideration by business departments. Finally, there is no reaction to IT needs if no reduction of business process-related costs can be assumed in consideration of necessary transaction or initial production costs. This explains why some IT needs remained open in the analysed case studies. Figure 3 summarizes the stated possibilities in the business decision to fulfil IT needs.

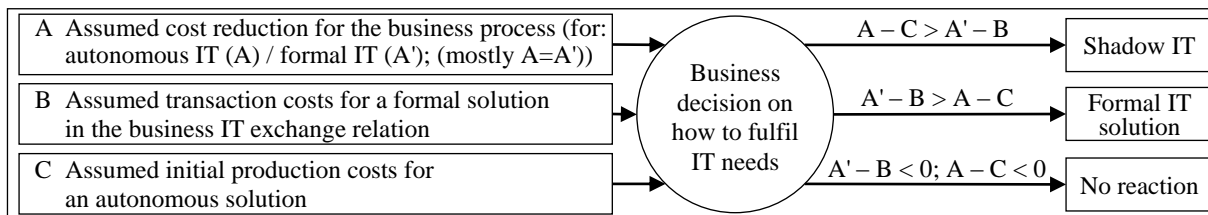


Figure 3. Influence of transaction and production costs on business decisions to fulfil IT needs

Figure 4 presents the artefact answering our research question. It draws an overall concept to explain Shadow IT emergence based on the triangulated results and characterized attributes stated before. Shadow IT results from the business decision regarding the fulfilment of IT needs, which is influenced by several causal conditions separately or along with others. Thereby, power and individual behaviour play a minor part. The majority of emerging solutions results from prohibitive transaction costs in the exchange relation of business and IT department. In this case, misaligned situations can additionally influence these costs. Furthermore, the decision depends on the availability of resources and expertise.

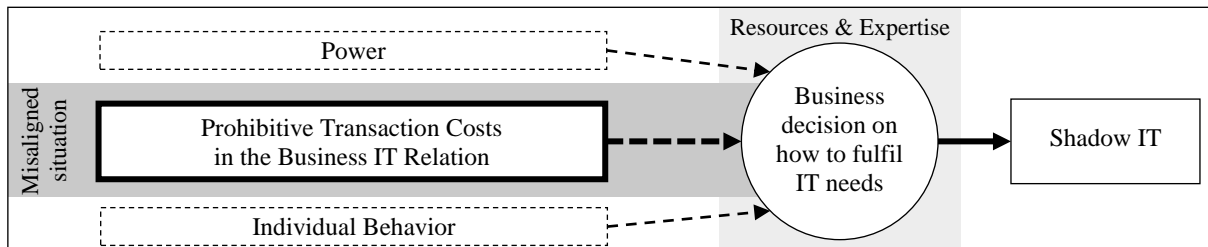


Figure 4. Overall concept to explain the emergence of Shadow IT

5.2 IT Governance Implications

The results state that transaction costs always exist in the relation of business and IT. They constantly influence business decisions on how to fulfil IT needs. From the local business perspective, Shadow IT seems to be reasonable. In this perception departments and users are subject to their bounded rationality and opportunism (Williamson, 1975). From the perspective of the entire organization, occurring risks and inefficiencies partially revise the position. To integrate both perspectives and allow measurable methods to manage Shadow IT, it is necessary to address the perceived transaction costs. Transaction Cost Theory provides ways to manage transaction and production costs and to maintain organizational adaptation simultaneously, by using governance structures (Williamson, 2005).

Recognizing transaction costs as an influencing element in the business IT relation contributes to IT Governance and BITA research. Generally, reaching a mature level of BITA promotes the reduction of transaction costs and their perception. In this way it reduces emerging Shadow IT. However, Shadow

IT may emerge during BITA harmonization and even in situations with an excellent state of BITA. Thus, potentially occurring Shadow IT should be addressed. Mechanisms are necessary to influence the make-or-buy decision behind Shadow IT decisions in the most efficient organizational manner.

Transactions differ in their asset specificity, uncertainty and frequency (Williamson, 1985). These dimensions are cost drivers and significant to choose the right way to coordinate organizational exchange (Williamson, 2005). Due to their bounded rationality business departments do not recognize these drivers in Shadow IT decisions. Organizations need to solve this problem by defining proper IT Governance structures (Weill and Ross, 2004). An approach is to redefine the allocation of IT activities for autonomous solutions. Based on the transaction specific dimensions, autonomous IT activities can either stay in the business or need to be transferred to the IT department. This implies an extension of IT Governance structures to decision rights on the business and user level as well as on the level of an individual IT solution. Following this argumentation, managers should be able to turn Shadow IT into a governed business-located IT. Allowing solutions with an informal character in a certain scope addresses the opportunities and risks of Shadow IT and fosters the BITA harmonization.

6 Conclusion

Shadow IT emerges primarily, because business departments or users assume that transaction costs for a formal solution are too high compared with an autonomous one. Misalignment can influence these costs and thus Shadow IT emergence. A mature BITA reduces, but cannot entirely prevent Shadow IT as transaction costs always exist in the business IT exchange relation. To manage Shadow IT, Transaction Cost Theory should be addressed. This implies mechanisms on structuring IT activities in terms of business-located IT and contributes to IT Governance research. Decision-makers and researchers addressing the business IT relation may use these insights to adjust governance concepts.

Nevertheless, we acknowledge several limitations. The gathered data represent only a sample of reality. However, due to the triangulation approach they should be sufficient for generalizable results. Findings may differ in other cultural settings and organizational types, as we focused on companies in Europe. Finally, our research is solely based on qualitative data. Due to vague variables, quantitative research and especially the measurement of costs related to Shadow IT are challenging to determine.

Further research can build on the transaction cost-related explanation of emerging Shadow IT. Addressing governance implications from Transaction Cost Theory allows to consider risks and opportunities of business- and user-driven IT processes. It is necessary to specify ways to allocate IT activities between business and IT departments based on the dimensions asset specificity, uncertainty and frequency. Further studies may contribute to a higher knowledge level on managing Shadow IT. Within the scope of IT Governance, we believe this paper provides an initial point for further research.

References

- Alavi, M., Nelson, R.R. and Weiss, I.R. (1988). Managing End-User Computing as a Value-Added Resource. *Journal of Information Systems Management*, 5 (3), 26-35.
- Askenäs, L. and Westelius, A. (2000). Five roles of an information system: a social constructionist approach to analyzing the use of ERP systems. In *Proceedings of the 21st International Conference on Information Systems, ICIS 2000*, Paper 40, 426-434, Atlanta, GA, USA.
- Bakos, J.Y. and Treacy, M.E. (1986). Information Technology and Corporate Strategy: A Research Perspective. *MIS Quarterly*, 10 (2), 107-119.
- Barker, S. and Fiedler, B. (2011). Decision Makers, Strategists or Just End-users? Redefining End-User Computing for the 21st Century: A Case Study. *Journal of Organizational and End User Computing*, 23 (2), 1-14.

- Behrens, S. and Sedera, W. (2004). Why Do Shadow Systems Exist after an ERP Implementation? Lessons from a Case Study. In Proceedings of the 8th Pacific Asia Conference on Information Systems, PACIS 2004, Paper 136, 1712-1726, Shanghai, China.
- Behrens, S. (2009). Shadow Systems: The Good, the Bad and the Ugly. *Communications of the ACM*, 52 (2), 124-129.
- Beimborn, D. and Palitza, M. (2013). Enterprise App Stores for Mobile Applications – Development of a Benefits Framework. In Proceedings of the 19th Americas Conference on Information Systems, AMCIS 2013, Chicago, USA.
- Berente, N., Yoo, Y. and Lyytinen, K. (2008). Alignment or Drift? Loose Coupling over Time in NASA's ERP Implementation. In Proceedings of the International Conference on Information Systems, ICIS 2008, Paper 180, 1-17, Paris, France.
- Boudreau, M.C. and Robey, D. (2005). Enacting integrated information technology: A human agency perspective. *Organization science*, 16 (1), 3-18.
- Brancheau, J.C and Brown, C.V. (1993). The management of end-user computing: Status and Directions. *ACM Computing Surveys*, 25 (4), 437-482.
- Chejfec, T. (2012). Shadow IT survey v3. <http://chejfec.com/2012/11/03/Shadow-it-infographic/Shadow-it-survey-v3/>, accessed 2013-11-24.
- Cleven, A. (2011). Exploring Patterns of Business-IT Alignment for the Purpose of Process Performance Measurement. In Proceedings of the 19th European Conference on Information Systems, ECIS 2011, Paper 19, Helsinki, Finland.
- Coase, R. (1937). The Nature of the Firm. *Economica*, 4 (16), 386-405.
- Corbin, J.M. and Strauss, A.L. (2008). Basics of Qualitative Research – Techniques and Procedures for Developing Grounded Theory. 3rd Edition. Sage Publications, Los Angeles.
- Craig, R. (1999). Laurier enterprise system upgrade. In Proceedings of 20th the International Conference on Information Systems, ICIS 1999, Paper 79, 654-662, Charlotte, North Carolina, USA.
- Creswell, J.W. (2009). Research design: qualitative, quantitative, and mixed methods approaches. 3rd Edition. Sage Publications, Los Angeles.
- De Haes, S. and Van Grembergen, W. (2008). Analysing the Relationship between IT Governance and Business/IT Alignment Maturity. In Proceedings of the 41st Annual Hawaii International Conference on System Sciences, HICSS 2008, 428, Waikoloa, HI, USA.
- Denzin, N.K. (2009). The research act: A theoretical introduction to sociological methods. AldineTransaction, New Brunswick, NJ.
- Dernbecher, S., Beck, R. and Weber, S. (2013). Switch to Your Own to Work with the Known: An Empirical Study on Consumerization of IT. In Proceedings of the 19th Americas Conference on Information Systems, AMCIS 2013, Chicago, USA.
- Drucker, P.F. (1999). Knowledge-Worker Productivity: The biggest challenge. *California Management Review*, 41 (2), 79-94.
- Ferneley, E.H. (2007). Covert End User Development. *Journal of Organizational and End User Computing* 19 (1), 62-71.
- Flick, U. (2009). An introduction to qualitative research. 4th Edition. Sage Publications, Los Angeles.
- Gerrity, T.P. and Rochart, J.F. (1986). End-User Computing: Are You a Leader or a Laggard? *Sloan Management Review*, 27 (4), 25-34.
- Giddens, A. (1979). Central Problems in Social Theory: Action, Structure, and Contradiction in Social Analysis: University of California Press.
- Graham, J.W. (2002). Constructing a student data warehouse. Proceedings of the 30th annual ACM SIGUCCS conference on User services, 174-175, Providence, RI, USA.
- Györy, A., Cleven, A., Uebernickel, F. and Brenner, W. (2012). Exploring the Shadows: IT Governance approaches to user-driven Innovation. Proceedings of the 20th European Conference on Information Systems, ECIS 2012, Paper 222, Barcelona, Spain.

- Harris, J., Ives, B. and Junglas, I. (2012). IT consumerization. When gadgets turn into enterprise IT tools. *MIS quarterly executive*, 11 (3), 99-112.
- Henderson, J. C. and Venkatraman, N. (1993). Strategic alignment: Leveraging information technology for transforming organizations. *IBM Systems Journal*, 32, 4-16.
- Houghton, L. and Kerr, D. V. (2006). A study into the creation of feral information systems as a response to an ERP implementation within the supply chain of a large government-owned corporation. *International Journal of Internet and Enterprise Management*, 4 (2), 135-147.
- Houghton, L. and Mackrell, D. (2012). The impact of individual, collective and structural Sensemaking on the usefulness of business intelligence data. *Proceedings of 7th the Mediterranean Conference on Information Systems, MCIS 2012, Paper 37, 1-10, Guimarães, Portugal.*
- Huuskonen, S. and Vakkari, P. (2013). "I Did It My Way": Social workers as secondary designers of a client information system. *Information Processing & Management*, 49 (1), 380-391.
- Jones, D., Behrens, S., Jamieson, K. and Tansley E. (2004). The Rise and Fall of a Shadow System: Lessons for Enterprise System Implementation. *Proceedings of the 15th Australasian Conference on Information Systems, ACIS 2004, Paper 96, Hobart, Australia.*
- Kerr, D., Houghton, L. and Burgess, K. (2007). Power Relationships that Lead to the Development of Feral Systems. *Australasian Journal of Information Systems*, 14 (2), 141-152.
- Kerr, D. and Houghton, L. (2008). Feral Systems: The Likely Effects on Business Analytics Functions in an Enterprise Resource Planning System Environment. *Proceedings of the 19th Australasian Conference on Information Systems, ACIS 2008, Paper 4, 484-491, Christchurch, New Zealand.*
- Kumar, V., Maheshwari, B. and Kumar, U. (2003). An investigation of critical management issues in ERP implementation: emperical evidence from Canadian organizations. *Technovation* 23 (10), 793-807.
- LeFave, R., Branch, B., Brown, C.V. and Wixom, B. (2008). How Sprint Nextel reconfigured IT resources for results. *MIS Quarterly Executive*, 7 (4), 171-179.
- Loose, M., Weeger, A. and Gewald, H. (2013). BYOD – The Next Big Thing in Recruiting? Examining the Determinants of BYOD Service Adoption Behavior from the Perspective of Future Employees. In *Proceedings of the 19th Americas Conference on Information Systems, AMCIS 2013, Chicago, USA.*
- Luftman, J. (2000). Assessing Business Alignment Maturity. *Communications of the Association for Information Systems*, 4, 1-51.
- McAlearney, A.S., Robbins, J., Hirsch, A., Jorina, M. and Harrop, J.P. (2010). Perceived efficiency impacts following electronic health record implementation: An exploratory study of an urban community health center network. *International Journal of Medical Informatics*, 79 (12), 807-816.
- Morton, P. (2006). Using Critical Realism to Explain Strategic Information Systems Planning. *Journal of Information Technology Theory and Application*, 8 (1), 1-20.
- Myers, M.D. (1997). Qualitative Research in Information Systems. *MIS Quarterly* 21 (2), 241-242. *MISQ Discovery*, archival version, June 1997, <http://www.misq.org/supplements/>. Association for Information Systems (AISWorld) Section on Qualitative Research in Information Systems, updated version, last modified: September 3, 2013 www.qual.auckland.ac.nz, accessed 2013-11-25.
- Myers, M. D. and Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and organization*, 17 (1), 2-26.
- Niehaves, B., Köffer, S. and Ortbach, K. (2013). IT consumerization under more difficult conditions. *Proceedings of the 14th Annual International Conference on Digital Government Research*, 205-213, Quebec, Canada.
- Ortbach, K., Bode, M. and Niehaves, B. (2013a). What Influences Technological Individualization? – An Analysis of Antecedents to IT Consumerization Behavior. In *Proceedings of the 19th Americas Conference on Information Systems, AMCIS 2013, Chicago, USA.*
- Ortbach, K., Köffer, S., Bode, M. and Niehaves, B. (2013b). Individualization of Information Systems – Analyzing Antecedents of IT Consumerization Behavior. In *Proceedings of the International Conference on Information Systems, ICIS 2013, Milan, Italy.*

- Prensky, M. (2001). Digital Natives, Digital Immigrants. *On the Horizon*, 9 (5), 1-6.
- Rentrop, C. and Zimmermann, S. (2012). Shadow IT Evaluation Model. In Proceedings of the Federated Conference on Computer Science and Information Systems, FedCSIS 2012, 1023-1027, Wrocław, Poland.
- Rockart, J.F. and Flannery, L.S. (1983). The management of end user computing: a research perspective. Sloan Working Papers 1410-83, Massachusetts Institute of Technology.
- Scott, S.V. and Wagner, E.L. (2003). Networks, negotiations, and new times: the implementation of enterprise resource planning into an academic administration. *Information and organization*, 13 (4), 285-313.
- Shumarova, E. and Swatman, P. A. (2008). Informal eCollaboration Channels: Shedding Light on "Shadow CIT". Proceedings of the 21st Bled eConference, BLED 2008, Paper 18, 371-394, Bled, Slovenia.
- Silvius, A.J.G. and Dols, T. (2012). Factors influencing Non-Compliance behavior towards Information Security Policies. Proceedings of the International Conference on Information Resources Management, CONF-IRM 2012, Paper 39, Vienna, Austria.
- Smyth, K. and Freeman, J. (2007). Blue Prism Rogue IT Survey 2007. *Blue Prism*, 1-5.
- Spierings, A., Kerr, D. and Houghton, L. (2012). What Drives the End User to Build a Feral Information System? In Proceedings of the 23rd Australasian Conference on Information Systems, ACIS 2012, Geelong, Australia.
- Thatte, S., Grainger, N. and McKay, J. (2012). Feral practices. In Proceedings of the 23rd Australasian Conference on Information Systems, ACIS 2012, Geelong, Australia.
- van Bon, J., de Jong, A., Kolthof, A., Pieper, M., Rozemeijer, E., Tjassing, R., van der Veen, A. and Verheijen, T. (2007). *IT Service Management. An Introduction*. Van Haren Publishing (ITSM Library), Zaltbommel.
- Venkatesh, V., Morris, M.G., Gordon B.D. and Davis, F.D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27 (3), 425-478.
- Venkatesh, V., Thong, J.Y.L. and Xu, X. (2012). Consumer acceptance and use of information technology. Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36 (1), 157-178.
- Wagner, E.L., Moll, J. and Newell, S. (2011). Accounting logics, reconfiguration of ERP systems and the emergence of new accounting practices: A sociomaterial perspective. *Management Accounting Research*, 22 (3), 181-197.
- Wagner, E. and Newell, S. (2005). Making Software Work: Producing Social Order via Problem Solving in a Troubled ERP Implementation. In Proceedings of the 26th International Conference on Information Systems, ICIS 2005, Paper 37, 446-458, Las Vegas, NV, USA.
- Walker, G. and Weber, D. (1984). A Transaction Cost Approach to Make-or-Buy Decisions. *Administrative Science Quarterly*, 29 (3), 373-391.
- Walters, R. (2013). Bringing IT out of the Shadows. *Network Security* 2013 (4), 5-11.
- Webster, J. and Watson, R.T. (2002). Analyzing the past to prepare for the future: writing a literature review, *MIS Quarterly*, 26 (2), 13-23.
- Weill, P. and Ross, J.W. (2004). *IT Governance. How top performers manage IT decision rights for superior results*. Harvard Business School Press, Boston.
- Williamson, O.E. (1975). *Markets and hierarchies: Analysis and antitrust implications*. The Free Press, New York.
- Williamson, O.E. (1979). Transaction-cost economics. The governance of contractual relations. *The journal of law & economics* 22 (2), 233-261.
- Williamson, O.E. (1981). *The Economics of Organization: The Transaction Cost Approach*. American journal of sociology, 87 (3), 548-577.
- Williamson, O.E. (1985). *The economic institutions of capitalism. Firms, markets, relational contracting*. The Free Press, New York.
- Williamson, O.E. (2005). The Economics of Governance. *American Economic Review*, 95 (2), 1-18.

Yin, R.K. (2014). *Case Study Research. Design and Methods*. 5th Edition, Sage Publications. Los Angeles.

Zimmermann, S. and Rentrop, C. (2012). Schatten-IT. *HMD – Praxis der Wirtschaftsinformatik*, 49 (288), 60-68.