

TECHNOLOGICAL FRAMES OF REFERENCE IN SOFTWARE ACQUISITION DECISIONS: RESULTS OF A MULTIPLE CASE STUDY

Completed Research Paper

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Abstract

Packaged software has gained importance across organizations. While literature has studied the adoption and implementation of packaged software extensively, research on software acquisition has been limited. Especially, scholars have called for more research from a sociological point of view. Software acquisition projects are complex endeavors during which multiple stakeholders and perspectives interact. With this study, we strive to illustrate social interactions in software acquisition decisions through the theoretical lens of technological frames of reference. We conducted a multiple case study with 15 experts from IT, business, and procurement. We find evidence for distinct technological frames across departments that are combined during the software acquisition process, ultimately resulting in common understanding and consensus. Furthermore, we identify eight salient framing effects that facilitate this dynamic alignment of frames. Our results allow for an extension of technological frames of reference theory and support decision makers in optimizing their software acquisition decisions and processes.

Keywords: Software acquisition, social interactions, packaged software, technological frames of reference, multiple case study

Introduction

Packaged software is gaining in importance. According to market research, packaged software spending by organizations will increase and hit more than 360 billion USD in 2013 (Melgarejo 2012, p. 138). Forrester reports that 63 % of organizations want to buy or utilize packaged software in the future (Roe 2011). As heterogeneous IT landscapes comprising different and individualized custom software solutions across functions and departments constitute one of the primary pain points for IS managers (Widjaja et al. 2012), many firms tend to prefer standardized packaged software when choosing new software solutions (Light 2005). Packaged software incorporates proven methods, allows for a limited amount of customization and can be utilized across functions and departments. Hence, the packaged software segment has been one of the fastest growing markets in software business for some time now (Luo and Strong 2004).

While scholars have dealt extensively with issues around the adoption of packaged software (e.g., ERP adoption (Buonanno et al. 2005)) and its implementation, research on the acquisition of packaged software has been limited and is underrepresented (Esteves and Bohorquez 2007; Howcroft and Light 2010). Studies on software adoption are mostly concerned with whether or not to adopt a certain type of software (“questioning the need”) until requirements are defined (Esteves and Bohorquez 2007). In contrast, the literature on software acquisition or procurement constitutes a separate and distinct literature stream in general. In our work, we follow Palanisamy et al. (2010, p. 613) regarding the conceptual understanding of enterprise software acquisition as “the execution of activities such as specification of the need, selection of one or more suitable vendors for the software, negotiation, contracting, placing the order, and monitoring the actual delivery”. With respect to the life cycle of packaged software which comprises three phases, pre-implementation, implementation, and post-implementation (Stefanou 2001), acquisition corresponds to the first phase (Poon and Yu 2010). Yet, choosing the optimal software has severe consequences for the subsequent phases (Lin and Silva 2005). Furthermore, the selection and acquisition of packaged software itself is carried out in complex and expensive projects that can consume a total budget of several millions (Mabert et al. 2001) and make up a significant portion of an organization’s IT budget (Verville and Halington 2002a).

During the process of software acquisition (SA) many different stakeholders are engaged (Verville and Halington 2003) – similar to other IT projects (Azad and Faraj 2008). These stakeholders possess different backgrounds, experiences, and knowledge on certain aspects of the acquisition process. “While package software is viewed as a bounded artefact, the same technology may be perceived differently by distinct groups of people” (Howcroft and Light 2010, p. 142). Following a similar line of reasoning, Wilson and Howcroft (2005) call for research that aims to understand the process of IS (or software) evaluation from different perspectives and takes into account social interactions. With this paper, we strive to answer these calls by studying software acquisition decisions from multiple perspectives. Precisely, this paper examines software acquisition decisions through the theoretical lens of ‘technological frames of reference’ (Orlikowski and Gash 1994). We followed a triadic case study approach with four cases and focus in particular on dynamic effects of how stakeholders in SA projects come to a final acquisition decision.

This paper aims to contribute in the following ways. (1) We demonstrate the applicability of technological frames of reference (TFR) models for packaged software acquisition projects. (2) We study SA decisions from multiple perspectives and gain new insights into the roles and perspectives of SA stakeholders. (3) While emphasizing on dynamic (“framing”) effects we contribute to TFR theory. More concisely, we find evidence for a complementing effect of different perspectives and technological frames which contradicts typical findings from TFR research and allows for an extension of TFR theory in general.

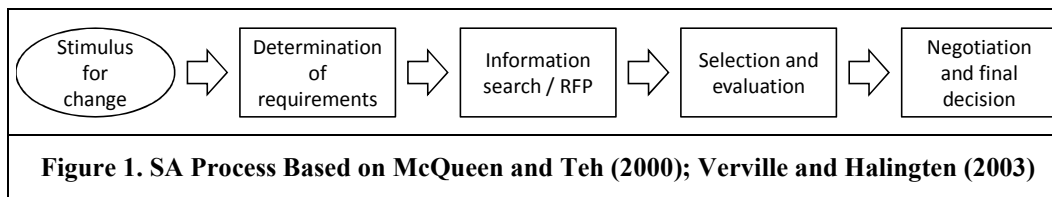
The remainder of the paper is structured as follows: In the next section, we give an overview of the relevant literature in the context of this study. In section three, we describe our multiple case study approach and provide general information on our cases. Afterwards, we present the findings on technological frames, framing structure, and framing effects that our cases exhibit. The key findings are subsequently discussed before we conclude the paper, discuss limitations, and indicate avenues for future research.

Theoretical Background

In the context of this study, two literature streams are of interest. First, we briefly describe the state-of-the-art concerning software acquisition (SA). Second, we present key findings of previous technological frames of reference research which has been a popular theory in related areas of IS research (Davidson 2006). In particular, we explain frame (in)congruence and dynamic effects, also referred to as frame shifting or framing. Within this paper, these distinct streams of research will be brought together and combined.

Related Work on Software Acquisition

In IS literature, a process-oriented view on the topic of software acquisition has been predominantly adopted. This study is based on a generic software acquisition process depicted in Figure 1.



The software acquisition process usually starts with a stimulus for change (McQueen and Teh 2000). Once the project is approved, requirements have to be determined (Deep et al. 2008). These requirements are used as a basis for identifying vendors that are able to fulfill these requirements (active information search (Verville and Halington 2003)) or included in the request for proposals (RFP (Goldsmith 1994)). The possible solutions and vendors are evaluated (Chau 1995), and a shortlist is selected (McQueen and Teh 2000). Finally, negotiations with one or more vendors take place until a decision is made (Howcroft and Light 2006; Palanisamy et al. 2010). Similar process models are described in other studies (Howcroft and Light 2002; Poon and Yu 2010; Uzoka et al. 2008). It is important to note that the sequence of the illustrated activities is not linear per se but iterations between phases can prevail (Verville and Halington 2003).

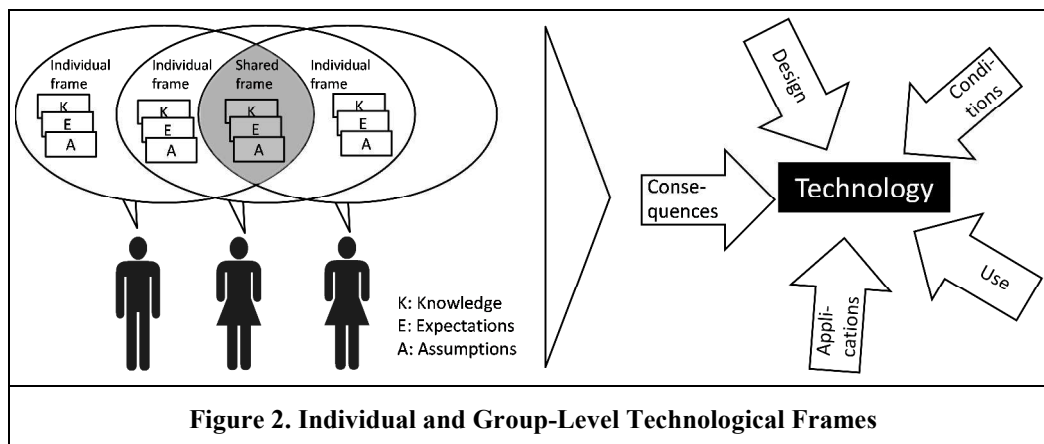
Besides literature that focuses in particular on issues around the selection of software (e.g., Benlian and Hess 2011; Jadhav and Sonar 2011; Keil and Tiwana 2006; Tsai et al. 2012), much research deals with the general theme of factors that influence software acquisition processes as such. These influences are not limited to certain process activities but occur throughout the acquisition project. Mostly, the framework of organizational buying behavior (Webster and Wind 1972a; Webster and Wind 1972b) is used as a theoretical foundation. This framework stems from marketing research and describes four categories of influences: Environmental, organizational, interpersonal, and individual (person-level). For the case of software acquisition, this framework has been frequently applied and extended. Environmental influences encompass, e.g., consultants (McQueen and Teh 2000; Palanisamy et al. 2010), legal (Verville and Halington 2002b), and political influences (Howcroft and Light 2002) that are outside of the procuring organization's scope. Organizational influences include firm characteristics (e.g., size (Adhikari et al. 2004)), and the SA as a project. Here, many known influences from project management are mentioned (Kunda and Brooks 2000; Verville et al. 2005). Influences that can be summarized in the interpersonal category concern factors that describe characteristics of groups, like user participation (Kunda and Brooks 2000) and careful selection of the team (Verville et al. 2005). Finally, as the software acquisition is carried out by individuals, there are also influences on a personal level. Knowledge (Saarinen and Vepsalainen 1994), skills (Chau 1994), or experience (Uzoka et al. 2008) are just some examples.

On the interpersonal and individual levels, interactions and relationships within groups and between stakeholders during the SA process play a vital role (Howcroft and Light 2002; Howcroft and Light 2006; Kusumo et al. 2011). Hence, understanding social interactions and different groups' interpretations of the packaged software that is to be purchased are important.

Technological Frames

The concept of technological frames of reference was introduced by Orlikowski and Gash (1994), drawing on social cognitive research but also on sociological literature examining the social construction of technology (Bijker 1995; Pinch and Bijker 1984). Individual technological frames are defined as “cognitive structures or mental models that are held by individuals” regarding a technology, its design, and use (Orlikowski and Gash 1994, p. 178). Also included within technological frames are conditions, applications, and consequences of the technology (Orlikowski and Gash 1994). Technological frames constitute templates for problem solving and serve to filter newly obtained information (Davidson 2002). They offer a “powerful lens” for understanding how people make sense of a certain technology (Orlikowski and Gash 1994, p. 178). This process of sense-making is important because, from an interpretive view, technologies are social artifacts that can only be understood in their social contexts.

On a group-level, individual members of social groups share common beliefs and expectations (Mishra and Agarwal 2010). Therefore, technological frames of reference are posited to exist also on an aggregated level. Group-level frames are “that subset of members’ technological frames that concern the assumptions, expectations, and knowledge they use to understand technology in organizations” (Orlikowski and Gash 1994, p. 178). These group level frames are found to act just like individual structures (Walsh 1995). Figure 2 depicts an overview of individual and group-level frames.



An example of distinct technological frames that illustrates the concept well is given in the study of Yeow and Sia (2008). Regarding the implementation of an e-procurement system, three identified social groups possess distinct frames. The operations department hopes to increase efficiency by adopting unified policies and best practices. The finance department primarily expects the system to reduce risks by implementing a defined, comprehensive, and limited version of the system. The management aims to exercise stronger control over their units’ procurement budgets through the software. During implementation, the system is shaped according to elements of these frames.

Congruence and Incongruence of Technological Frames

Much research has investigated the phenomenon of frame congruence or incongruence (Mishra and Agarwal 2010). Congruence of technological frames refers to “the alignment of frames on key elements”. Congruent frames are not “identical but related in structure (i.e., common categories of frames) and content (i.e., similar values on the common categories)” (Orlikowski and Gash 1994, p. 180). Incongruence, in contrast, refers to significant differences in frame content.

The majority of empirical results indicate that incongruence between frames causes difficulties and problems in software or IS implementation projects (Barrett 1999; Davidson 2002; Lin and Conford 2000; Orlikowski and Gash 1994). Also, incongruencies within a frame can lead to skepticism toward the adoption of new and better technology (Davis and Hufnagel 2007, p. 697). Frame congruence, on the other hand, is found to be positively related to end-user satisfaction (Shaw et al. 1997) and allows for more efficient decision-making (Walsh et al. 1988). Lin and Silva (2005) posit that successful implementations are facilitated by achieving congruent technological frames. Once consensus about a logic of action is

reached, it can be ‘translated’ into software (Kandathil et al. 2011). Results from research on mental models – as one of the concepts technological frames are built on – indicate the existence of a positive effect of congruence on performance (Mathieu et al. 2000).

Whereas the major stream of research describes frame congruence as advantageous, some findings contrast these results. Socio-cognitive differences may facilitate diverse interpretations of information and improve group decision making (Davidson 2002). The findings by Kilduff et al. (2000) indicate a positive relationship between cognitive differences within teams and team performance, accompanied by the observation that more successful teams reduce incongruence during the project. Walsh et al. (1988) argue that broad knowledge and decreased consensus are important in early stages of decision making. Tying together these findings, Davidson (2006) summarizes that frame incongruence cannot necessarily be considered harmful.

Framing and Dynamic Alignment of Frames

In addition to the analysis of individual frame contents, some TFR research has dealt with the dynamic alignment of frames and the elicitation of a general framing structure, but more research has been called for (Azad and Faraj 2008; Davidson 2006; Davidson and Pai 2004). Existing studies describe a common framing structure which consists of the following three phases: (1) frame differentiation as the process through which different perspectives interact with each other, (2) frame adaptation as the process of shifting the initial frames until finally (3) frame stabilization comes to pass and a “truce frame” emerges (Azad and Faraj 2008). The last step of frame stabilization is commonly referred to as closure. Closure implies that a dominant meaning among the different relevant social group emerges (Bijker 1995). In general, this is achieved by imposing a certain group’s frame onto the other groups (e.g., Azad and Faraj 2011). Yet, some studies report that the “winning frame” (which is inscribed into the technology in focus) incorporates elements of different groups’ frames (e.g., Yeow and Sia 2008).

Existing findings suggest that the use of power and politics are important means to achieve closure (Kandathil et al. 2011; Lin and Silva 2005; Robey and Sahay 1996; Yeow and Sia 2008). Moreover, interaction and communication between participants in a project are essential (Pinch and Bijker 1984; Sarker et al. 2005). Yeow and Sia (2008) show that a mixed strategy comprising the use of power and discursive strategies fares best. Another facet is the exchange of knowledge through interaction during the process (Robey and Sahay 1996). This accounts for the partial reframing of a group’s understanding of technology (Hsu 2009). Closure can also be reached by redefining the key problem that a technological artifact is supposed to solve (Pinch and Bijker 1984). However, other mechanisms of closure “must be researched” (Pinch and Bijker 1984, p. 430).

The literature on software acquisition and the literature on technological frames of reference are able to cross-fertilize each other. On the one hand, our knowledge about the acquisition of packaged software can be extended by focusing on social interactions and relationships. On the other hand, the topic of software acquisition promises to be an interesting new application domain for TFR research. While packaged software is subject to social negotiations and interpretations of SA participants, their interpretations are constrained by the nature of packaged software. Packaged software is less flexible than customized software, which has been studied predominantly in TFR research so far. Therefore, we examine the acquisition of packaged software through the lens of technological frames of reference, which amends the body of knowledge both on TFR and SA. By bringing both research domains together within this paper, we respond to calls for more research on social aspects in software acquisition decisions (Howcroft and Light 2010; Wilson and Howcroft 2005).

Research Approach

In order to understand the sense-making process in the context of packaged software acquisition decisions, we follow an interpretative case study approach. Interpretivism asserts that reality and our understanding of reality are social products which cannot be understood independent of social actors (Orlikowski and Baroudi 1991). In addition, knowledge of reality is always socially constructed (Walsham 2006). Qualitative interpretive case studies are suited ideally to explore cognitive processes behind judgments of technology (Nardon and Aten 2012). In our approach, TFR theory was used as a theoretical lens or “as part of an iterative process of data collection and analysis” (Walsham 1995, p. 76). We opted for TFR because it allows us to study social interactions, goals, and assumptions in the context of the software that is to be procured (Allen and Kim 2005). Therefore, thought processes, not only happenings can be understood that are associated directly with the software in focus (Lin and Conford 2000). For its capabilities to analyze and distinguish between participant’s frames on the hand and to understand the dynamic inherent in frames on the other hand, TFR seems to be particularly appropriate for our purpose. Other theories (e.g., rational decision making or diversity theories) would fit the topic well in parts but do not offer the same wide-ranging opportunities.

We decided to apply a multiple-case design following mostly literal replication but also theoretical replication logic (Yin 2009). The purchased software was associated with differing importance and impact for the respective organizations. For the course and reporting of the study, we took care to adhere to the principles described by Klein and Myers (1999). Our study involves four cases from three different organizations. The units of analysis are singular software acquisition decisions (Yin 2009). We identified three relevant social groups that are present in software acquisition projects, following Pinch and Bijker (1984). These groups represent three different departments: IT, the primary business unit initiating the acquisition, and the purchasing department (Verville and Haltingen 2003; Yeow and Sia 2008). Hence, by taking into account these three groups, we apply a triadic case study approach

To enhance the validity of findings we employed data triangulation and utilized multiple sources of evidence (Yin 2009). We collected data within two waves: First, we conducted in-depth interviews with at least one member of each department. In addition, we assembled supplementary documents (company information, process descriptions, and project specific documents), which were used to corroborate results. Second, we developed a structured questionnaire based on the findings in the first wave that was sent to all interviewees. Yet, the interviews constitute our primary data source (Walsham 1995). In total, we carried out 13 interviews with 15 interviewees, who had on average 16 years of experience in their respective fields. The interviews lasted 71 minutes on average, were recorded (if permission was obtained, else extensive field notes were taken), and transcribed. Furthermore, informal discussions during field-site visits provided valuable insights, which were also written down in field notes, resulting in a total of 211 analyzable pages.

The questionnaire in the second wave consisted of three parts. Part one was concerned with descriptive information on the individual software acquisition cases and personal experiences of the interviewees. In part two, we asked about the specific SA decision and different perspectives of participants using 7-point Likert-scale items. In the final part, we surveyed the degree of involvement with topics found to be relevant in SA projects and process activities. The employed items were self-developed and emerged from the iterative analyses of the data collected in phase one. The questionnaire was cross-checked and validated by the authors themselves together with two practitioners. Whereas the first wave of data collection follows a purely interpretive methodology, the data collected in phase two inhibits elements of positivist research. Wave two can be described as complementing wave one in a weak constructionist sense (Orlikowski and Baroudi 1991). The results from the second wave were used to corroborate our findings (Walsham 2006). Finally, when answers or statements were not clear, we contacted the interviewees via mail or telephone for clarification.

Case Information

An overview of our case firms, the investigated software acquisition projects, and involved interviewees is given in Table 1.

The ALPHA case was located within a firm from the process industry. The internal auditing department was in need of a new audit management software because support for the current software had expired. A procurement project was initiated, and several supplier options were evaluated. Possible solutions were demonstrated in vendor presentations with the procurement team. At the time of our study, two suitable software packages were still in the run, but a clear favorite had emerged. From a functional point of view, the favorite could be handled more easily and had better offline support.

The case of BETA took place in a financial institution. A very heterogeneous landscape of systems and software was in use to process payment transactions across countries, subsidiaries, and types of payment. External institutional pressure in form of new regulations for handling payment transactions by the European Union was taken as an opportunity to select and buy a new and integrated software package. As payment transactions are at the heart of financial institutions and the project volume was high, many participants were active in the project. Our three interviewees were the persons most involved in the process, and they had senior positions. At the time of data collection, final negotiations were taking place. The software had already been selected, and a plan for the subsequent implementation phases had been created.

GAMMA and DELTA were situated in the same firm from the transport industry but represent two very different types of acquisition projects. While GAMMA was about the procurement of office and operating systems for workplaces, DELTA comprised the selection and acquisition of website-related software. For GAMMA, supplier choices were very limited and the primary efforts went into collecting internal demands, choosing price, license, and contractual models, all of which were negotiated with the present supplier. The IT department did not participate in the operational procurement process but made the final decision and was concerned with supplier management. DELTA, on the other hand, represents a software procurement project in which multiple options were present, and final solutions were chosen in discussions with all participants. The project pertains to the procurement of sales and sales analytics software for the company website.

Case	ALPHA (A)	BETA (B)	GAMMA (Γ)	DELTA (Δ)
Industry	Process industry	Finance	Transport	Transport
Employees	>30,000	>50,000	>100,000	>100,000
Sales	> € 10,000 m	> € 500,000 m	> € 20,000 m	>€ 20,000 m
Type of purchased software	Audit management	Payment transactions	Operating system and office software	Website-related systems
Total duration	1 year	9 months	1 year	1 year
Total volume	> € 50,000	> € 5,000,000	> € 5,000,000	> € 5,000,000
Current project phase	Final evaluation	Negotiation	Acquisition completed	Acquisition completed
Interviewees	3	3	5 ^{*)}	5 ^{*)}
Positions of interviewees	P: ITC procurement agent IT: Information manager B: IT auditor (project manager)	P: Director IT procurement IT: Managing IT director B: Director of operations	P: IT procurement manager, IT procurement agent ^{*)} IT: Head of IT, IT supplier relationship manager B: Director license management	P: 2 IT procurement agents ^{*)} IT: 2 IT project managers B: Online sales manager

^{*)} The IT procurement agent in GAMMA was also involved in DELTA. We interviewed him about both SA projects in one interview. Therefore, we have a total of 15 (not 16) interviewees.

Data Analysis

Our data analysis approach for identifying technological frames of reference is consistent with Orlikowski and Gash (1994)'s analysis. In order to avoid getting locked into certain themes, as cautioned by Walsham

(2006), we employed an inductive grounded method (Glaser and Strauss 1967). Using technological frames of reference as a focusing lens, our methodology follows Robey and Sahay (1996) by assigning codes to texts, integrating these codes to themes, aligning the themes with relevant social groups, and finally comparing the findings. The process of data analysis within this study is depicted in Figure 3. Analysis steps are numbered; results are marked in grey.

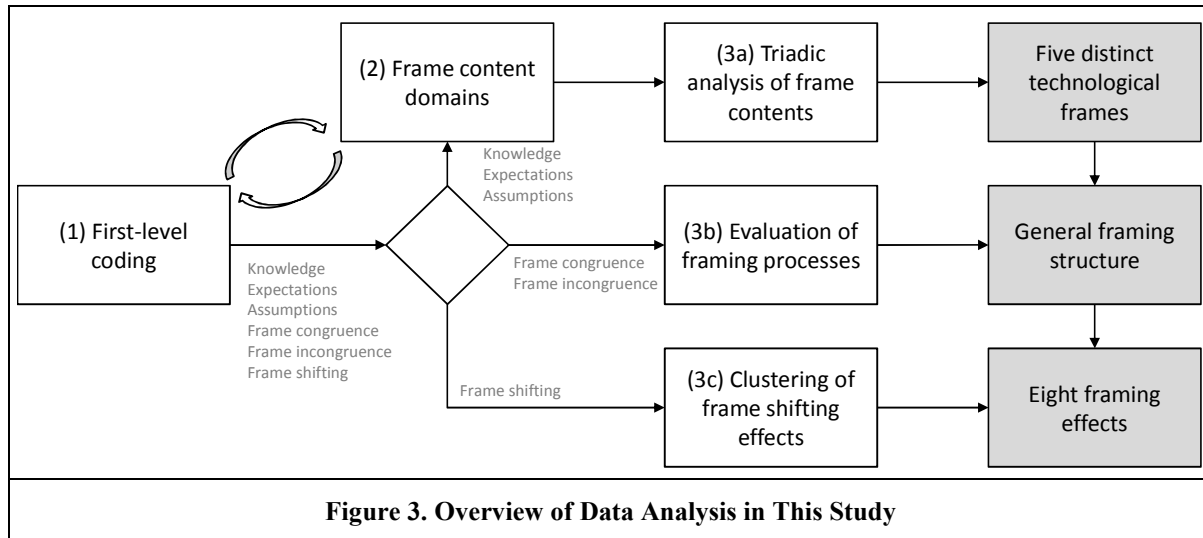


Figure 3. Overview of Data Analysis in This Study

In the first step, we used a technique of first-level coding (Miles and Huberman 1994) and assigned codes to all statements that reflected knowledge, expectations, and assumptions – which make up the frame content domains in TFR theory. Furthermore, we coded all statements concerning frame (in)congruence and frame shifting with separate code categories. Their usage is depicted in grey font in Figure 3. Coding was done using the software package Atlas.ti. The first-level coding process resulted in a total of 377 different codes. 70 of those codes summarize statements about knowledge, 132 about expectations, 135 about assumptions, 15 about frame (in)congruence, and 25 about frame shifting. In the second step, we clustered the codes concerning knowledge, expectations, and assumptions into different frame content domains, conducting a sort of pattern coding (Miles and Huberman 1994). The complete process was repeated iteratively throughout the data collection phase in order to reflect new findings and ideas (Orlikowski and Gash 1994; Yin 2009). For the complete sample, five frame content domains emerged and theoretical saturation was reached (Eisenhardt 1989). The final domains reflect themes that were found to be common across all cases and groups. Subsequently, we evaluated the codes and underlying statements in step (3a) for the identified relevant social groups' frame content domains on an individual case level, since frame content cannot simply be compared across cases (Davidson 2006). Step (3b) comprised the examination of the framing process across cases as a common structure had emerged in early analysis. In the last step (3c), frame shifting effects were analyzed throughout all cases. For this purpose, all statements that reflected frame shifting were clustered until a final set of effects emerged.

The quantitative data collected in wave two was used to check rival interpretations and to support the previously obtained results. For data analysis, we applied descriptive statistics and contingency tables.

Results of the Multiple Case Study

In this section, we present the results of our multiple case study. First, the results of the static frame analysis are described and the existence of distinct technological frames is demonstrated, exemplified by one of the identified frame domains. Second, we concentrate on the structural and dynamic aspects of framing.

Frame Analysis

In total, we found five different frame domains that are represented at different levels throughout relevant social groups and cases. These five frame content domains, which emerged from the clustering, are:

1. **Strategy implementation:** Refers to aspects concerning strategic options an organization has or acquires through the procured software but also includes notions about a more general environment the software has to fit in. The core of this domain resembles the technology strategy frame (Orlikowski and Gash 1994). This frame domain comprises codes like, e.g., “A – Holistic view is crucial”, “E – Relation between business processes and systems will change”, or “K – Knowledge about the business environment” (K: knowledge, E: expectations, A: assumptions).
2. **Project management:** Refers to people’s views that the acquisition project itself is in focus and plays an important role, as well as notions about the management of the respective project. Exemplary codes within this domain are “A – Project is in focus” or “K – Structure of RFP”.
3. **Provision of functionality:** Refers to people’s understanding which functionality the software has to provide. This domain also includes viewpoints and ideas about future applications of the software. Thus, it is similar to the original technology in use frame (Orlikowski and Gash 1994). This domain contains codes like “A – Software needs to work” or “E – New software should be better”.
4. **IT operations:** Refers to the view by participants in the software acquisition project that the procured software has to be managed in a technical sense. Operations must be ensured, technical requirements fulfilled, and the software must be compatible with the existing IT infrastructure. This domain is comprised of codes such as “E – Software must fit into the system landscape” or “K – Operations of software”.
5. **Cost & supplier management:** Refers to people’s understanding and attitudes toward cost, budget, and the management of (potential) suppliers during and after software acquisition. Within this content domain, we clustered codes like “E – Vendor aims at getting the best for himself”, “K – Knowledge about the history of supplier relation”, or “A – Costs are essential”

Table 2 gives an overview of the degree of involvement with these frame domains for the relevant social groups in our study. The table builds on the intensity of statements made by our interviewees that reveal their own knowledge, expectations, and assumptions regarding the frame domains. The quantitative responses in the survey concerning the degree of involvement were employed for corroboration.

Cases	ALPHA			BETA			GAMMA			DELTA		
	P	IT	B	P	IT	B	P	IT	B	P	IT	B
Strategy implementation	□	□	□	□	□	□	■	□	□	□	□	□
Project management	□	■	□	■	■	□	■	□	□	■	■	□
Provision of functionality	□	□	■	□	□	■	□	□	■	□	■	■
IT operations	□	■	□	□	■	□	□	□	□	□	■	□
Cost & supplier management	■	□	□	■	□	□	■	□	■	■	□	□

Legend: ■=strong involvement; □ = medium involvement; □ = minimal involvement; □ = no involvement

The results show that the degree of involvement differs concerning departments and cases. Due to distinct types of software, software acquisition processes, and different individual competences, each SA project is unique. In the following, we demonstrate that not only the degree of involvement varies but also different topics are focused across departments. We do so by describing the key content elements for the ‘cost & supplier management’ domain. We chose this domain as an example because all interviewees showed at least a medium degree of involvement with cost and supplier issues. Furthermore, within this domain, we find the most similarities between departments across our four cases. Therefore, if the goals and expectations are found to be different within this domain, we can conclude that IT, business (B), and procurement (P) possess distinct frames.

In general, for procurement, the management of cost is essential as demonstrated by the following quote:

“The question is about costs. If I paid for the product for the course of three years based on this pricing model – license plus support, I could also buy it anew after three years, considering the amount I pay. It is not worth it!” (Procurement, GAMMA)

Besides, the management of relationships with the vendors, negotiations, and vendor evaluations are common themes that are in focus of the procurement units. The results of the IT group are rather distinct. The existence of different vendors is acknowledged, but the prospective collaboration is more in focus than finding the cheapest supplier.

“I am a person who creates win-win situations. In this matter [negotiation with the vendor], it is also important that everyone gets the feeling that he did well. If someone believes that he is the winner and the other one the loser, it does not foster collaboration.” (IT, BETA)

The business units are mostly interested in finding a vendor that is able to fulfill their respective needs. Price and cost are less important.

“We do not not [sic!] care about the price, but the procurement department is looking more onto the price label. [...] We approach from the problem formulation side and take a look on the price label afterwards.” (Business, GAMMA)

In Table 3, the detailed contents of the relevant social groups’ frames with respect to the cost & supplier domain are illustrated along our four cases.

Table 3. Frame Content for Procurement, IT, and Business for the ‘Cost & Supplier Management’ Domain				
Cases Units	ALPHA	BETA	GAMMA	DELTA
Procurement	<ul style="list-style-type: none"> • Cost is essential • Supplier dependence must be kept low • Software contracts are adhesion contracts 	<ul style="list-style-type: none"> • Vendors are evaluated neutrally and fairly • Total cost are essential 	<ul style="list-style-type: none"> • Negotiations are key • The suppliers are well-known and familiar • Commercial aspects are crucial 	<ul style="list-style-type: none"> • Vendors are evaluated fairly • Suppliers are well-known and familiar • Commercial aspects are crucial
IT	<ul style="list-style-type: none"> • The solution must be economically reasonable • Possible suppliers’ solutions differ 	<ul style="list-style-type: none"> • Collaboration with the vendor is important • Cost and price matter 	<ul style="list-style-type: none"> • Well-established solutions are preferable • Cost need to be considered deliberately 	<ul style="list-style-type: none"> • Cost effectiveness is essential • Collaboration with the supplier plays an important role
Business	<ul style="list-style-type: none"> • Supplier has to fulfill our needs • Collaboration with the supplier is important • Supplier must be able to handle the project 	<ul style="list-style-type: none"> • The vendor must get involved with the future user 	<ul style="list-style-type: none"> • Solutions and interests of suppliers are well-known • Price and licensing must be suitable 	<ul style="list-style-type: none"> • Cost effectiveness is essential • Dependence on supplier must be taken into account

Exemplified by knowledge, expectations, and assumptions the three departments exhibit, we conclude that distinct technological frames of reference exist. IT, procurement, and business emphasize diverging aspects and focus on discriminative goals. These goals and expectations are not mutually exclusive but differ significantly.

Framing Structure

In the previous section, we have shown that distinct frames are in place. As described earlier, existing research mostly suggests that frame incongruence across participants is associated with negative consequences (like delays, dissatisfaction, failure, etc.) for projects. However, within the SA processes in our four cases, we did not find evidence for negative outcomes resulting from frame incongruence. Instead, we encountered evidence for a dynamic nature of frames. The initially established different views are consolidated during the SA process, pointing to the existence of a general framing structure. An example of the necessity for framing is given in the following quote:

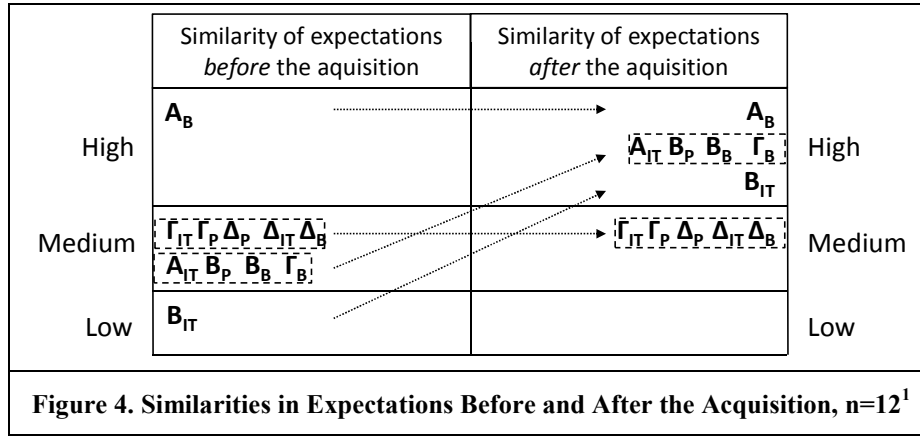
“Procurement has a different point of view than business. These are two worlds colliding. [...] [However,] these worlds must complement each other, else it doesn’t work out.” (Business, GAMMA)

Again, we find similar notions expressing the need for a consolidation of viewpoints across all cases, e.g.:

“It is crucial that we come together and that all of us possess the same understanding of [the system].” (IT, ALPHA)

“We had the consensus that all of us could agree at the end of the day with absolute peace of mind.” (IT, BETA)

These statements are supported by the results of the second wave of data collection (the survey). Figure 4 illustrates data from the questionnaire that substantiates dynamic alignment. We asked whether participants in the respective SA case had common expectations about the software before and after the project. In the figure, our respondents are displayed as $CASE_{Department}$, e.g., A_B indicates the response of the business manager at ALPHA.



The results show that when expectations were very similar (“high”, 6-7 on the Likert scale) before the SA, they were still similar after the project. Some respondents indicated common expectations on a medium level (3-5 on the Likert scale) that did not change much throughout the project. All other interviewees support the thesis that the project helped to bring together or consolidate their expectations: Similarities after the project are greater than before (“high”). Results based on other questionnaire items are able to corroborate and particularize these findings; they are pictured in Figure 5. The questions covered the respondents’ views about the SA decision retrospectively, concerning the way of decision-making within the acquisition team (all participants), the manner in which the different perspectives contribute on a group-level (per perspective), and the respondents’ personal satisfaction with the final decision.

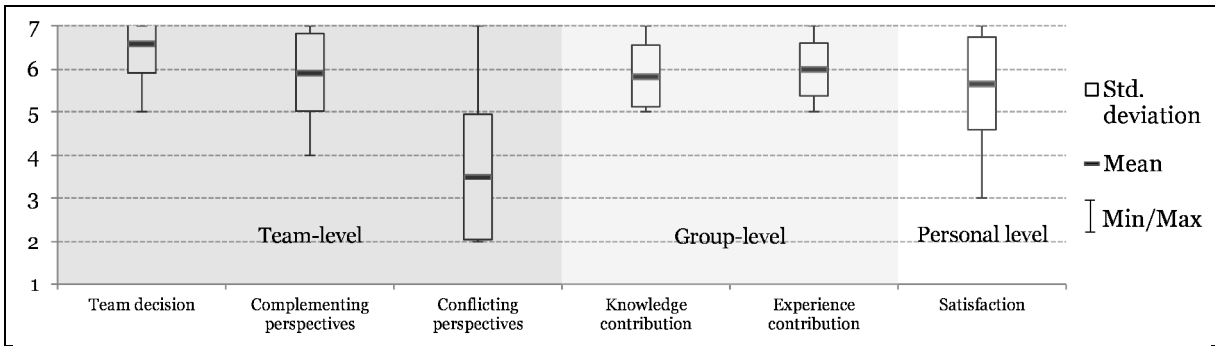


Figure 5. Results of the Quantitative Survey Concerning Framing Structure, n=12¹

The results indicate that decisions are made by the whole *team* (item 1 in Figure 5, all references to items in italics). The different views *complement* each other rather than being in *conflict*. The participants believe that all group members *contributed* with their previous *knowledge* and *experience* to the final decision which ultimately resulted in high personal *satisfaction*. While we did find evidence of potential conflicts within the data (see also Harnisch et al. (2014)), conflicts were resolved before they posed serious threats for the SA project as a whole. Therefore, we conclude that distinct technological frames of

¹ The questionnaire was sent out to all interviewees. In total, we received 12 responses. However, the response of the procurement manager at ALPHA is missing. All other perspectives are covered. As both IT managers in the DELTA cases answered, and their responses regarding the questions displayed in Figure 4 did not differ, we show only one Δ_{IT} item. All displayed results are based on single items. The measurement scale ranged from 1 (“I do not agree”) to 7 (“I completely agree”). The similarity of expectations before and after the project was assessed based on one item each within the same questionnaire. Therefore, the data might be “noisy” and subject to a certain bias.

reference are brought together within the SA process, which implies a general framing structure. Participants in the SA are able to contribute their perspectives within the process until final decisions are made in consensus. This general structure resembles the findings of Azad and Faraj (2008) and can be described as follows: First, distinct frames are in place. Then, these frames are adapted and shifted until finally, common understanding is achieved.

Framing Effects

In this section, we focus on effects we found that build and support the previously described structure. These effects enable and facilitate the process of framing. The results originate from an iterative data analysis process. All statements relating to frame shifting or framing had been coded during first-level coding. Eight framing effects finally emerged through an inductive clustering process. They can be broadly categorized into two groups: (A) Framing effects inherent in the process and (B) framing effects that concern actions, attitudes, or knowledge of the people involved in the software acquisition process. The effects that we found to be in place in the four cases are displayed in Table 4. The assessment of effect strengths within the table is based on the interview statements of our participants. Since we cannot be sure whether certain effects had no impact in some cases or were just not mentioned by the interviewees, we do not go into detail regarding cross-case similarities or differences. Instead, we will describe the effects and their general mechanisms of action in detail. Within the next two subsections, the particular effects we describe will be highlighted in bold font.

Cases	ALPHA	BETA	GAMMA	DELTA
Process-related framing effects				
Goal-oriented focus	□	□	▣	▣
Early definition of procedures	□	□	▣	■
Tool support	■	■	■	■
People-related framing effects				
Discussion and discursive strategies	■	■	■	■
Power	▣	▣	▣	■
Attitudes	□	▣	▣	▣
Participation	▣	■	▣	▣
Knowledge transfer	■	□	▣	▣

Legend: ■=strong effect; ▣ = medium effect; ◻ = weak effect; □ = no effect found

Process-related Framing Effects

With regard to process-related framing effects, we found evidence for a strongly **goal-oriented focus**. Once an acquisition project team is formed, there is an explicit goal of the project: To reach agreement on the software that should be bought. This focus tends to make team members accept compromises and have interest in a solution that is acceptable for anybody, as illustrated by the following quote:

“You are meeting in the team and everyone has their own opinion but will have to implement it anyway [...] Life is not a picnic, and the project and goal are in the foreground.” (Procurement, GAMMA)

Prior literature also supports the relevance of a focus on goals. Group uniformity is an implicit necessity which makes people shift their opinions ('technology adoption by groups' model, Sarker et al. 2005). Also, common aims are an important feature to achieve organizational change (Wagner and Newell 2006).

The second effect is the **early definition of procedures**, which comprises two aspects: On the one hand, the software procurement processes in the cases we studied were clearly defined and structured. There were fixed procedures about the acquisition team and process activities. On the other hand, these procedures require the detailed definition of specific requirements and selection criteria by the acquisition

team. As closure concerning the latter aspects had to be reached before the SA decision itself, the result of the evaluation method that everybody agreed on was less exposed to contestation and disagreement. These findings stem primarily from the DELTA case: Requirements and selection criteria were defined prior to supplier presentations. The business side came to know interesting new features which they had not thought of initially during the presentation of supplier A, whose offer was more expensive. With respect to functionality, they would have preferred and chosen this software. However, in the following discussions it became clear that the other software solution (supplier B) also fulfilled all requirements that had been defined before. While supplier A offered more nice-to-have-features, it was found that the cost for the defined core requirements clearly favored supplier B. Hence, supplier B's solution was chosen in agreement with all participants.

The third effect that related to the acquisition process concerns **tool support** as a means to bring together evaluation results from different perspectives. Evidence for the crucial importance of this effect can be found in all cases. The individual tools that are used differ, but all of them incorporate best practices of the respective firms about how to evaluate software solutions. In a nutshell, these tools list all requirements from a functional, IT, and procurement point-of-view and allow for the evaluation of each requirement with a certain value. The different software solutions are evaluated, and individual requirements are weighted until a final score per solution results. The utilization of tools ensues a ranking accepted by all group members which provides the basis for a decision in consensus. The relevance of this effect is highlighted by the following statement concerning the usage of the tool for decision-support.

“This is the result! [...] In an implicit manner, we defined an algorithm for decision-making with the tool.” (Procurement, DELTA)

Although weighted scoring approaches like the one described have been used for evaluation and support of SA decision-making processes for a long time (e.g., Jadhav and Sonar 2009), the importance of tool support in the context of framing has not been discussed so far.

People-related Framing Effects

The second overarching group subsumes the effects that are related to the people carrying out the software acquisition. During the course of projects, lasting several months, many meetings took place in which all members of the acquisition team actively participated. Along the way, **discussions** and reconciliations were common. The evidence suggests that these discussions facilitated a common understanding. Some interviewees posited that a give-and-take mentality during the project was crucial, indicating the purposeful use of **discursive strategies**. The relevance of discussions, negotiations, and discursive strategies in the context of framing has been studied in social cognitive IS literature for some time (Azad and Faraj 2008; Pinch and Bijker 1984; Sarker et al. 2005; Wagner and Newell 2006; Yeow and Sia 2008). We find similar effects for the case of software acquisition, exemplified by the following quotes:

“We’ve got four different opinions [in the group], and then we discuss pros and cons. And in the end, there will be a decision.” (Business, ALPHA)

“From my point of view, it is always a give-and-take-process. [...] It will never be the same for different projects.” (IT, BETA)

Besides the usage of discursive strategies, some interview statements point to the presence of **power**. All acquisition teams were conscious about the fact that there was a higher management level involved in the process. The final decisions were always approved by the management, yet issues of power were not interfering during operational acquisitions – with the exception of case DELTA. Here, management pushed the project over an initial barrier when IT and business were not able to agree on how requirements should be described within the request for proposal.

“This discussion was terminated by management and it was stated: Just do it!” (IT, DELTA)

The quote illustrates that power is an important mechanism that is able to advance projects and to reach decisions. In this case, the business' point of view about the definition of requirements was prioritized and accepted for the course of the project, even by the IT department. In a TFR sense, the business perspective's frame was imposed upon IT. The influence of power (and politics) has also been demonstrated in previous software acquisition cases (Howcroft and Light 2006) and TFR research (e.g., Kandathil et al. 2011; Wagner and Newell 2006; Yeow and Sia 2008). Moreover, in our study, the IT

representative at BETA was clear about his powerful position (he was the highest-ranking project team member) but refrained from using it. Yet, his quote demonstrates that power is an issue even if it is not exercised.

“If I had said it doesn’t make sense, it [the project] wouldn’t have come to pass [...] I didn’t play that openly. I wanted all of us to argue into the same direction, and this is how we went into the final decision round.” (IT, BETA)

Team members’ **attitudes** on how interactions with each other take place and attitudes toward the expected project outcome have an effect on closure. In our cases, we encountered effects similar to the notion that involved parties need to understand what “makes the other tick” (Wagner and Newell 2006, p. 44).

“It depends on the willingness or enthusiasm of business about IT issues, and how much the IT colleagues are interested in problems of the business side.” (IT, DELTA)

Furthermore, we found evidence for the importance of **joint participation** of all team members. By taking into account all perspectives and frames, people gain the feeling that they contribute to the final SA decision and that their opinions are considered. This is exemplified by the following quote:

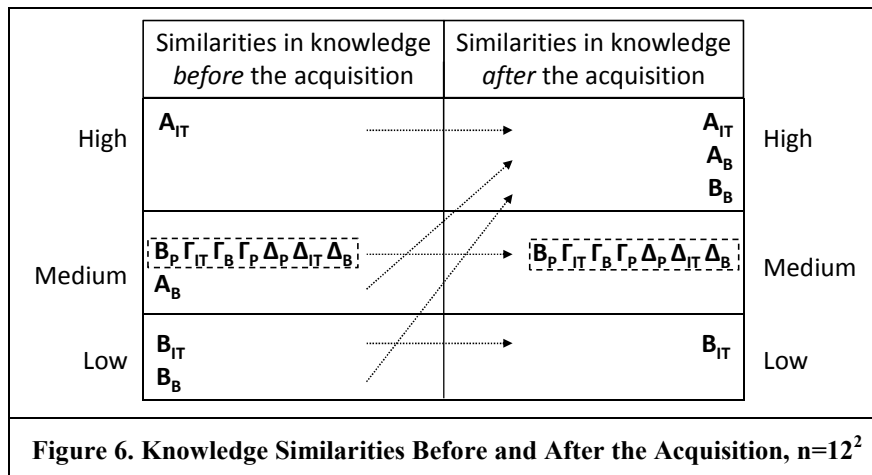
“You must be careful not to lose anybody along the way. Everybody must be able to recognize: ‘There is also a part of myself in this software’. You cannot behave like bulls in a china shop, but you have to take the people along with you.” (IT, BETA)

Finally, our data supports the significance of **knowledge transfer** through primarily individualized knowledge sharing mechanisms (Boh 2007), which has also been previously acknowledged as affecting framing processes (e.g., Hsu 2009). Featured prominently in the ALPHA case, both the business and IT units stated that they learned from each other, which helped to reach a common understanding and ultimately closure.

“The participants from business already know their business processes, know the language, the application problems, and they gather knowledge about data and methods. The combination of these two aspects creates value.” (IT, ALPHA)

“And IT helped us and said: We’ve got to formulate the requirements independently from the [old] tool. [...] This way, we were raised from the very detailed level and aggregated it a bit more.” (Business, ALPHA)

Since knowledge is one of the core aspects incorporated into technological frames, we covered the transfer of knowledge separately in our questionnaire. Comparable to the assessment of common expectations (cf. Figure 4), we asked our respondents about similarities in knowledge before and after the project. The results are shown in Figure 6.



The responses of two participants (the business managers of ALPHA and BETA, displayed as A_B and B_B) indicate that knowledge similarities after the project are greater than before, which suggests that

² The answers were on a 7-point Likert scale (1-2: low, 3-5: medium, 6-7: high). The responses of both IT managers at DELTA did not differ. Therefore, they are displayed as one single item (Δ_{IT}).

knowledge transfer occurs during SA projects. Most interviewees indicate medium levels of knowledge similarities before and after the SA project. The answers of BETA's IT manager (B_{IT}) appear to contradict the existence of knowledge transfer. His replies imply that the three perspectives possess low levels of common knowledge before but also after the project. However, when we asked him about this obvious difference, he stated:

“Procurement will certainly have a deeper understanding of the software [than before] but not at the same level as business and IT, respectively. In my opinion, this is not necessary either.” (IT, BETA)

Hence, knowledge transfer is also acknowledged in this exceptional case. In summary, we found support for the existence of different framing effects. These effects account for the general framing structure by combining the distinct technological frames. Once common understanding is achieved, decisions can be made in consensus.

Discussion of Key Findings

The two types of framing effects – related to process and people – can also be described from another point of view. While the process effects in our cases were imposed from “outside” (procurement processes are defined by the organization), the people-related effects involve the active participation of SA team members. Both types of effects were found to shape expectations, knowledge, and assumptions about the software that is selected. Some of the effects corroborate existing findings from TFR research. However, to the best of our knowledge, we uncovered three effects that have not been mentioned before.

Especially the effect of tool support was assessed as crucial by our interviewees. We find that the tool shapes opinions and brings together different views. The application of the tool differed throughout cases. At ALPHA, all participants evaluated all criteria individually, at BETA, all participants assessed the criteria jointly in a group meeting, and at GAMMA and DELTA, each department was allowed to assess the criteria that were most important to them. However, the effect was similar across all cases. Eventually, a ranking was established and commonly accepted (for being perceived as useful or being obligatory). Similar findings have been obtained in sociological studies analyzing the role of rankings. Research in this stream indicates that rankings influence the actors that create or apply them and that rankings are capable of shaping economies, markets, and society (Espeland and Sauder 2007; Pollock and D’Adderio 2012). On a small scale, our findings resemble these results. All perspectives seem to agree on the resulting ranking, which consolidates distinct points of view. Overall, tool support allows for the formalized and structured participation of all perspectives and is thus related to many of the other effects that we described. It is a mean for the transfer of knowledge (Hsu 2009), enhances the feeling of joint participation and is part of the early definition of procedures.

The early definition of procedures is another framing effect that has not been discussed in the context of technological frames of reference so far. As soon as procedures are clearly defined and well-structured, people tend to (and must, in an organizational context) follow them. We believe that this way, the contestation of different frames is moved to an earlier moment, when the procedures are defined for the first time. Once differences have been resolved and procedures are in place, later process activities run more smoothly. Hence, it seems that common understanding can be achieved more easily. Given that we were only able to study cases that already had well-established and accepted procedures, it might be interesting to focus on the establishment and definition phase of procedures in order to analyze how eventually distinct frames of reference are taken into account in that stage.

Last but not least, it is important that all participants within the software acquisition team get the feeling of joint participation. This can potentially be attributed to the project characteristics of software acquisition decisions. In extant SA literature, aspects like, e.g., the style of leadership (Verville et al. 2005; Verville and Halington 2002b) and the way of communication (Kunda and Brooks 2000) have been mentioned and may have an impact on the feeling of joint participation.

The framing effects we described comprehensively are able to extend our knowledge on TFR. We found that frame adaptation is a complex task that is influenced by various effects. These effects constitute means that can help practitioners to optimize their processes. On the one hand, some of the illustrated effects can be actively employed as needed, especially the execution of power. We found that this mean imposes certain frames onto other groups, which is in line with existing findings (Kandathil et al. 2011; Lin and Conford 2000). However, the effects that are in place in structured organizational decision

making contexts (like tool support, early definition of procedures) do not enforce certain frames but cater for the adaptation and convergence of distinct frames. Therefore, our analysis of framing effects contributes to TFR research by explicating previous findings on frame adaptations and frame shifting (Azad and Faraj 2011; Davidson 2006).

Also, the focus we put on framing effects helps bringing the two separate streams of research on frame (in)congruence and framing structure or dynamic alignment together (Davidson 2006). Our results offer interesting insights into the consequences of frame incongruence (Davidson and Pai 2004). Although incongruent frames are present in the four cases we analyzed, these incongruences do not result in delays in decision making, dissatisfaction, or even failure. Since framing takes effect, the positive aspects of frame incongruence (Kilduff et al. 2000; Walsh et al. 1988) seem to come to the fore. Whereas previous studies find support for the enforcement of certain technological frames by an especially powerful relevant group (e.g., Lin and Conford 2000), the percentage of IT decisions that are made collaboratively and not primarily driven by IT or business has recently increased considerably (Dhar et al. 2004). Our findings support this notion. In the investigated cases, decisions were made in consensus and all perspectives were taken into account. The different perspectives and frames seem to contribute jointly to the final decision. This might be due to the special nature of software, requiring business knowledge in order to understand and define functional requirements as well as IT knowledge for operations and technical requirements. Procurement naturally comes into play when large organizations decide on cost-intensive goods.

With regard to the context of SA our study is situated in, our findings that incongruent technological frames of reference are in place for distinct departments and that they are combined and adapted throughout the SA process sheds light on the importance of social interactions and shared participation of business, IT, and procurement during packaged software acquisition. Although packaged software is limited with respect to customizability and adaptability, we find that expectations, knowledge, and assumptions of distinct groups, as well as their interactions and (actively engaged or passively experienced) framing, are crucial in order to come to a final selection and acquisition decision.

Overall and from an interpretative standpoint, people make sense of their understanding of packaged software during and via the procurement process. Software acquisition projects – through the lens of technological frames of reference – seem to fulfill an ambiguous role: On the one hand, they require input from different perspectives and all relevant departments. Thus, distinct and incongruent frames are desirable, so that broad topic coverage can be achieved. On the other hand, we find decisions to be made jointly and in consensus. Therefore, the process of framing and the achievement of closure are relevant. We conclude that both aspects should be taken into account in well-conducted software acquisition decisions. In other terms: Good software acquisition projects start with diverse opinions and diverse teams, integrating all ideas and perspectives. In the (long) way to a final decision, it is important to discuss discrepancies and to bridge gaps – until the final decision for a particular software package is reached collectively. Kilduff et al. (2000, p. 33) put similar advice into words: “Take advantage of the natural cycle of work; in the beginning let ambiguity flourish; in the end, strive for heedful interrelating”.

Conclusion

In our multiple case study, we found support for a general alignment structure of the framing process concerning software acquisition decisions. Distinct technological frames exist in the relevant groups of IT, business, and procurement. We found evidence for mechanisms and effects that help to combine these frames, so a final decision can be made in consensus. The final decision is usually based on the frames of all participants. Thereby, not one single frame is enforced but mutual understanding is developed until real closure is reached.

Our study does also have some limitations. Case study research is always limited in generalizability, interpretive research even more so. Frame content can hardly be transferred across cases, but the results suggest a framing structure which is of a more general nature. Not all identified framing effects will and must be present in all cases. Moreover, there can be more effects than we discussed. Yet, the mode of functioning of these effects and the results that occur can be generalized to other software acquisition projects. We do believe that the effects are not limited to acquisition projects but can also be observed whenever distinct frames exist, and a final decision has to be made in consensus. Furthermore, due to the interpretive nature of our research, the results we described represent the sense-making process of the researchers. We took care to rely on observed events and statements but subjective personal judgments can never be neglected.

Still, this paper offers a number of methodological and theoretical contributions. It is the first study that we know of featuring a multiple case approach applying TFR theory. By evaluating the four cases individually with respect to frame content but presenting 'true' multiple case results concerning framing and frame structure, we believe to offer valuable insights on a methodological level for the community. While we do not dive into the individual cases as deeply as typical single case TFR studies, we believe that our results are sufficiently in-depth to allow for the analysis of technological frames. On a theoretical level, we demonstrated the applicability and suitability of TFR theory to software acquisition cases. We find support for complementing effects of different technological frames, contrary to but advancing our knowledge on technological frames in the SA context. Furthermore, we presented insights into the effects that facilitate closure in detail. Thereby, we are able to specify and extend our knowledge on framing processes.

Our research is also of relevance for practice. We studied software acquisition processes in large enterprises from a holistic point of view. The individual case descriptions represent best practices in large enterprises. We found differing but similar approaches which can serve as reference models for practitioners. We shed light on social interactions during software acquisition decisions that play a vital role. The described framing effects can be useful in order to optimize software procurement activities and decisions. Including different perspectives right from the start in SA projects and enabling framing processes might lead to informed and quick decisions, which are perceived as successful and accepted by all relevant social groups. The eight framing effects we found are important to know of. Some of them can be purposefully employed in order to facilitate consensus. Other effects need to be taken into account when designing general organizational frameworks and processes.

As for future research opportunities, we encourage the application of interpretive case studies in IS acquisition and implementation cases. We found this approach to be very rewarding in the understanding of individual participation and sense-making processes. While our approach focused on multiple cases it was predominantly of retrospective nature. Therefore, longitudinal work on framing processes, detailing and extending the effects we initially presented, might be fruitful and complement our holistic perspective. Furthermore, our study is purely on the customer side of software acquisition decisions. It could be worth to include the vendor perspective and explore how technological frames of reference are shaped on the vendor-side and in the interaction between vendors and customers. Given the increasing relevance of packaged software, potentially amplified by the rise of software-as-a-service, further research on software acquisition is of overall high relevance for IS research and practice.

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