Towards modular service architectures in a network context

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Abstract

Innovative service management is a matter of increasing importance. Therefore, the aim of this study is to describe modular service architecture of the case under study, and examine how the service architecture and service triad approach can support buyer's management of travel services and improve efficiency in switching an intermediary. In our case study the focal service triad consists of a buyer, intermediary and supplier (i.e. buyer, travel management company, and technology provider). The network and triad approaches help us to understand the web of actors, and the value net connected to service purchasing and supply. We apply modularity as a tool to decompose service architecture, the levels and modules of which the architecture consists of, and interfaces between the modules. The empirical context is corporate travel purchases is public procurement, and the methodology applied is longitudinal case study and insider action research.

Our results show that understanding of modular service architecture can support efficiency in switching an intermediary in a triad. The results also show that the triad under analysis is truly modular. The suggested modular service architecture provides benefits in switching an intermediary, such as flexibility and efficiency. The study extends the scope of the research beyond the traditional dyadic approach by developing a framework for modular service architecture in a triadic context. The study provides also new information on how modular service architecture and service triads can be used for efficient management of service modules in switching an actor in a triad and in wider service supply networks. Managers can apply the framework for modular architecture and service triads in intermediary and supplier selection, and in the efficient management of operational processes.

Key words: service triad, modularity, service architecture, service development, switching intermediary, corporate travel, longitudinal study.

Type of paper: competitive.

INTRODUCTION

Services constitute a major part of GNP in developed countries (Spohrer & Maglio, 2008; Spohrer & Kwan, 2009), and the debate on service development and management of service organizations has increased rapidly (e.g. Sundbo, 1994). One of the key challenges in the management of service operations is to choose collaboration partners in the network. An important enabler in efficient management of service operations has been the advancements of IT supported services. Services are important area to study because management in buying organizations has traditionally focused on developing purchases of manufactured goods (Ellram et al., 2004), and relatively little research has been conducted in order to create a comprehensive framework for understanding and managing service supply chains (Ellram et al., 2004; Ellram et al., 2007; Baltaciogly et al., 2007; Bigné et al., 2008) i.e. the networks in which the companies are operating.

We aim to contribute to earlier business-to-business service network studies by exploring how modularity approach and service triads can be used in switching an intermediary in public procurement context. First, the modularity approach, which has been shown a useful concept especially in modern industrial management, has lately attained growing interest also in the service context (Voss & Hsuan, 2009). Prior research has found that sharing modular components with external suppliers can lead to more efficient service processes (Janssen & Joha, 2008). Second, there has been a call for empirical studies in triadic relationship settings in service contexts (Wynstra et al., 2012; van der Valk & Iwaarden, 2011; van der Valk & Weele, 2011). The service triad concept has been developed to describe situations where the buying organization contracts a supplier, and where the service is delivered directly to the buyer's customer (Wynstra et al., 2012). To fill this gap in current research, we have conducted an empirical study in corporate travel management, where service triads are central in the development of service processes. Travel industry is network bounded, but managerial applications of network research in travel and tourism are scarce (March & Wilkinson, 2009). Furthermore, academic studies on corporate travel in general, and tourism supply chain and tourism product development studies specifically have been limited (Zhang et al., 2009; Gustafson, 2012; Gustafson, 2013). Also collaboration in travel supply network has obtained limited attention (Bigné et al., 2008; Zhang et al., 2009; Andreu, et al., 2010).

The industrial network approach provides concepts to understand the web of actors embedded in the travel and tourism network. Network approach to travel services is relevant, because 'packaging' the final service offering requires decision making, communication, cooperation and coordination among a number of interrelated actors providing complementary and competitive services. The number of suppliers involved in one single business trip with multiple destinations complicates travel purchasing and process management. In companies with large travel budgets, service delivery is generally outsourced to a business travel agency, which acts as an intermediary simplifying the network of suppliers and complementing each other's offerings. Many business travel agencies have changed their name to a 'Travel Management Company' (TMC) in order to emphasize the change from a booking agent to the buyer's partner and consultant (Davidson & Beulah, 2003).

Travel costs are generally estimated as the second or the third largest controllable cost after wages and IT (Aquilera, 2008; Faulconbridge et al., 2009; Sigala, 2007). Corporate travel can be defined as "*travel undertaken by the employees of a particular organization that has a substantial travel volume and where travel arrangements are generally managed and consolidated into a centralized function*" (Douglas & Lubbe, 2006). It is important to have a

person in the buyer organization with the right to make decisions and take the responsibility of the travel management process (Mayer, 2007; Rose, 2008). Holma (2013), for example, noticed that the buyer is not dependent on a specific intermediary if the buyer has a professional travel manager and a well-organized travel management process. Buyers see corporate travel often as an opportunity to implement cost-cutting strategies (Aquilera, 2008). Savings can be obtained, for example, by automating service processes, and by implementing stricter travel policies (Douglas & Lubbe, 2010). Despite its importance, academic literature has paid relatively little attention to corporate travel and how it could be managed efficiently (Gustafson, 2012). Therefore, we provide a case study of how modularity and service triads are used in indirect sourcing. *Our aim is to examine how service architecture and service triad approaches can support buyer's management of travel services and improve efficiency in switching an intermediary*. We apply the concepts from modularity research to decompose the service architecture of corporate travel process, and we comprise modular service architecture for business travel. Furthermore, in our empirical study in a triadic context, we test if this architecture is modular in a situation where the buyer switches the intermediary. We focus on the focal triad connected to corporate travel purchasing and supply, a triad that consists of a buyer, travel management company (travel intermediary) and technology provider supplier. The research questions are: What is the modular service architecture of business travel management process like? Is the case company's travel management process modular?

This research contributes to interoganizational research and to service purchasing and supply research by extending the traditional dyadic perspective to a triadic, and by providing a case in a scarcely studied business travel management. Our longitudinal case study adds to understanding of ongoing service purchasing processes, a gap discovered by, e.g. van der Valk et al. (2009). The study adds also to business-to-business service network research by analyzing the modular architecture of a service supply network, and of triadic relationship settings. For managers, the framework can be a useful tool in the efficient management of operational processes, in supplier selection, and in outsourcing decisions. The paper is organized as follows. We begin with a literature review, where we discuss service networks, dyadic and triadic relationships, and the modularity approach. Thereafter, we explain the methodology of the study. Subsequently, we present the actors of the focal triad. Thereafter, we decompose the service architecture of the corporate travel management process, and with the help of the architecture, we analyze the situation of the switch of the intermediary. The last section concludes the study and suggests avenues for further research.

LITERATURE REVIEW

Business-to-business service networks

Despite the growing interest in service industries, the field of service research suffers from several limitations. Service research is mainly based on services marketing theory, and focusing on consumer markets. Furthermore, the relationships are mainly investigated from a dyad's or from an individual firm's perspective. However, more recently service research has applied network and business-to-business approach (see for example Syson & Perks, 2004; Ramos, Roseira, Brito, Henneberg & Naude, 2013). In this study, we apply inter-organisational theory and specifically industrial network approach (INA) to understand how actors in a network interact. The ARA model (Håkansson & Johanson, 1992) provides a conceptual framework of the process and outcomes of interaction, and helps us to investigate how the actors are connected, how resources are allocated between the actors, and how the activities are linked (see e.g. Gadde, Håkansson & Persson, 2010; Håkansson & Snehota,

1995). Gadde (2004) argues that activities in distribution have become more and more interdependent. These interdependencies are cross-organizational, thus connecting the resources of different firms. Therefore, companies are increasingly dependent on resources controlled by other firms (Gadde, 2004: 163).

Even though INA has its foundations in industrial networks, it provides insights for case studies in service context to understand the connectedness of relationships, and the collaborative and co-creational characters of services (Ramos et al., 2013). According to the INA approach, firms are connected to a network of relationships through actor bonds, resource ties and activity links that are formed when firms interact and adapt to their partners (Håkansson & Johansson, 1992). Interconnected relationships create complex networks, which provide access to other firms' resources (Ford & Håkansson, 2006; Håkansson & Snehota, 1995). Connections may be indirect when an intermediary or a middleman acts as a link between two firms. In service networks suppliers may include both traditional suppliers and traditional industrial companies providing customized offerings or solutions (Ramos et al., 2013:952). Ramos et al. (2013) argue that this complexity can only be captured by employing a services network approach (see also Morgan et al., 2007; Tikkanen, Alajoutsijarvi, & Tähtinen, 2000; Zolkiewski, Lewis, Yuan, & Yuan, 2007). In corporate travel context, a business trip may consist of a combination of services provided by a travel management company (TMC), technology provider as well as transport and accommodation companies. An intermediary (TMC) often acts as supplier by integrating different travel related services to a complete business trip.

Business networks have been described as interactive and inherently dynamic with coexisting stability and change (Ford & Håkansson, 2006; Ford & Redwood, 2005; Halinen, Salmi, & Havila, 1999; Hakansson & Snehota, 1995). The general pattern of business relationships is relatively stable, even though the existing business relationships provide a platform for continuous interaction and change. Relationships may end, and new relationships are established, which causes dynamics in business networks. Incremental changes occur when actors in the network interact. However, also discontinuities and radical change are observed as empirical phenomenon in business networks (Havila & Salmi, 2000). Havila et al. (1999) define *confined change* as seemingly 'stable situation' in a network, because it remains within a dyad, and is not received or acted upon by other actors in the network. Examples of confined changes include relational aspects in the dyads, for example variation in the perceived trust between the parties, or changes in the character of activities performed in co-operation. However, when a change in one business relationship impacts other business relationships in the network, it can be characterized as *connected change*, i.e. change in one relationship that is received and acted upon by other actors in the network. A change which is spread to another business relationship may cause a 'domino effect' among several connected business relationships (Hertz, 1998). Analysing triadic relationships is pointed out to be a relevant method to capture dynamics in complex supply networks (Wu et al., 2010).

Dyads and triads embedded in the wider business network

Industrial Network researchers emphasize the interaction between individual buying and selling firms, and call for simultaneous analysis of both the buying and selling sides of relationships (Ford, 2011: 232). Our study investigates how a buyer is connected to a wider network of competing suppliers, which are also complementing each other. Some of the suppliers act as intermediaries, connecting the buyer to other suppliers, and form thus triadic relationships (see Figure 1).

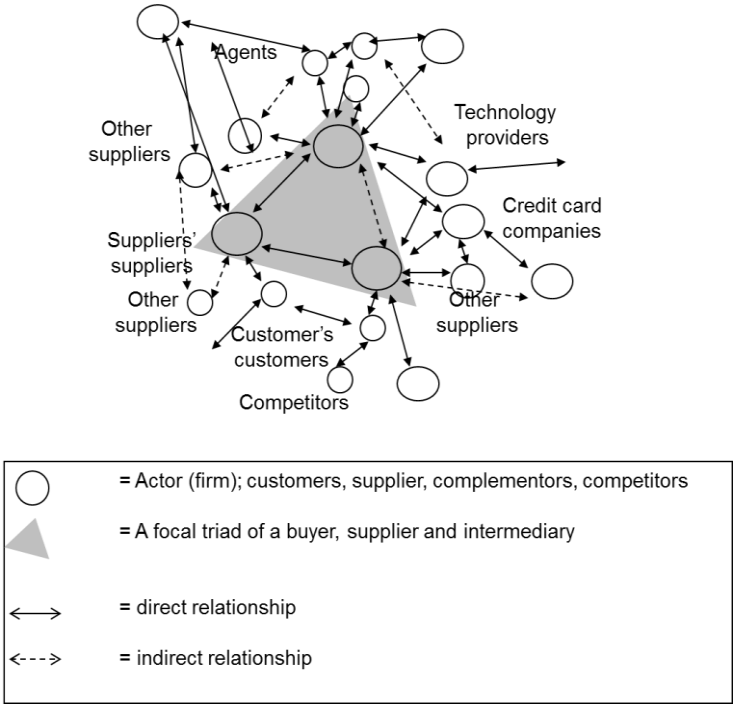

Figure 1: A focal triad embedded in a wider network (adapted from Holma, 2010: 75).

A shift in the focal unit of analysis from dyads to triad consisting of three connected relationships has several benefits. A triad is the smallest conceivable unit of analysis in which it is possible to study connections between dyads in a network. Studying triads is important in order to understand the behavior of a network, and to uncover the effects of connected dyads in certain processes (Madhavan et al., 2004; Choi & Wu, 2008; Choi & Wu, 2009a; Dubois, 2009, Andersson-Cederholm & Gyimóthy, 2010; Peng et al., 2010). For analytical purposes, a network can be deconstructed into triads, and network effects can be demonstrated with triads (Ritter, 2000). Ritter gives system selling as an example of connected relationships, where capabilities and resources of more than one company are bought together in order to "provide a 'complete' or 'complex' solution to the customer" (Ritter, 2000: 318). In order to understand buyer–supplier (in our case intermediary)–supplier relationships and their relational dynamics, we need to understand simultaneously how one dyad in the triad affects the other two dyads (Dubois & Fredriksson, 2008; Wu & Choi, 2005). Furthermore, the cooperative and competitive aspects of the relationships may be revealed by investigating a triad (Dubois & Fredriksson, 2008). The concept of "service triad" has been used to describe, for example, purchasing or outsourcing situations where the buying organization contracts a supplier, and where the service is delivered directly to the buyer's customer (Wynstra et al., 2012).

Until now, the majority of studies applying the concept of triad have been conducted in manufacturing contexts (e.g. Wu & Choi, 2005, Rossetti & Choi, 2008; Wu et al., 2010). The growing importance of service purchasing has raised the interest to study service triads in various constellations: for example, triads consisting of buyer-supplier-customer (Li & Choi, 2009), buyer-seller-intermediary (Bask, 2001), buyer-intermediary-supplier (Holma, 2012), and buyer-subcontractor-end customer (van der Valk & van Iwardeen, 2011; Finne & Holmström, 2013). Three actors are involved also, for example in situations with a buyer and two competing suppliers (Wu & Choi, 2005; Dubois & Fredriksson, 2008; Choi & Wu, 2009b; Peng et al., 2010; Wilhelm, 2011), two buyers and a supplier (Choi & Kim, 2008), and when a supplier is interacting with an intermediary and an end-user (Rossetti & Choi, 2005; 2008). Triad studies in service context have focused on risk assessment (Li & Choi,

2009), sustainable supply chains (Mena, Humphries & Choi, 2013), contracts (Tate et al., 2010; Wynstra et al., 2012), monitoring (Van der Valk & Van Iwaarden, 2011), cooperation and adaptations (Holma, 2012), relationship between supply chain strategy and logistics services (Bask, 2001), dynamics of the relationships (Holma, 2010), strategic management (Peng et al., 2010), and service quality (Niranjan & Metri, 2008). (See Wynstra et al., 2015 for a review of prior triad studies).

The service triad under research in this study is a buyer-intermediary-supplier triad, and we take the buyer's perspective. Corporate travel purchasing is inherently featured by triadic relationships, because there is generally a travel intermediary between the buyer and the suppliers (Gustafson, 2012; Holma, 2012). It is important to study service triads (Peng, Lin, Martinez & Yu, 2010; van der Walk & van Iwaarden, 2011) to provide insights on how services provided in such contexts can better be managed and developed. In our focal service triad, buyer (customer) plays an active role, and uses an intermediary to enforce access to the supplier. It has been recognized in earlier research that the development of internal indirect sourcing competence would generally require the purchasing function to have some direct involvement in the service design and specification process (Karjalainen et al., 2008).

We investigate the network of actors in corporate travel purchasing and delivery, and how the buyer is connected to the network of service suppliers (directly or indirectly) through its dyadic and triadic relationships (see Fig. 1). In these relationship constellations, solutions are developed to support corporate travel purchasing process. In most of the studies, the focal triad consists of three organizations. However, an actor in a triad may also be an individual employee as the end user of the service (Holma, 2012), or an internal department (Tate et al., 2010). Thus, our study covers two buyer's roles: the organization as a buyer of corporate travel services, and the end users (business travelers) within the buying organization as the buyers of their own travel. This kind of dual role in buyer organization is typical for indirect sourcing, and we include both these perspectives in our study. Also prior researchers have noticed the importance of involving the buyer and the end-customer in the study (Holma, 2012; van der Valk et al., 2013). Furthermore, travel service purchasing and delivery processes involve both managerial and operational processes, and these two processes are included in our study.

To conclude, triads are worth studying as there is a scarce amount of scholarly research applying the concept of triad in service context, and even less with the focus on switching an intermediary. Buyer, intermediary and technology provider form the core triad, not only in corporate travel process, but also in many other service processes. In the following section, we will discuss the modularity approach, which has not, to our knowledge, been combined with the service triad concept.

Service architecture and modularity

Modularity is a topical subject, which has been extensively studied in the context of products, product designs, production and organizations (Bask et al. 2010). Modularity has lately raised interest also in the service settings and new empirical studies have been called for in the service context (Voss & Hsuan 2009; Dörbecker & Böhmann 2013). Bask et al. (2010: 366) define a **modular system** as "*a system built of components, where the structure ("architecture") of the system, the functions of the components ("elements", "modules"), and the relations ("interfaces") of the components can be described so that the system is replicable, the components are replaceable, and the system is manageable*". Literature brings forth several managerial benefits that can be obtained by using modularity approach: In addition to cost savings, typical benefits include simplification of complex systems, ability to

offer variety in the offering, increased flexibility (van Liere et al., 2004; Jose & Tollenaere, 2005; Hyötyläinen & Möller, 2007) and economies of scale. Modularity also enables firms to serve a variety of customer needs (Schilling & Steensma, 2001; Voordijk et al., 2006). In service offerings, modularity has been seen as expedient in enabling cost efficient (mass) customized services. The modular service offering can include standardized base services, customized services, and their combinations (Tuunanen et al., 2012). While moving toward service-based economy, suppliers are at the same time looking for new and cost-efficient ways to provide a variety, and different levels of mass customization. Also modularity in processes may help companies to meet challenges in the service development (Bask et al., 2011b). In the tourism supply chain management context Zhang et al. (2009) describe that service products consist of different service components, and therefore the modular product design is suitable for tourism product development. In their service offerings, suppliers need to provide cost efficient service solution and flexibility and responsiveness for their customers. Thus, the outcome expectations for the corporate travel services are cost efficient service product and smooth service delivery processes. Technology providers in the travel industry have developed global e-based service offerings with standard service components and standard interfaces for mixing and matching of service components efficiently. This is in line with Baldwin and Clark (2000), who found out that a complex service product is built from smaller subsystems (modules) that are designed independently but function together as a whole. By using standard modules with standard interfaces, a supplier can provide multiple combinations to meet a variety of customer needs.

The core constructs of modularity are architecture, modules, and interfaces. In service design, it is extremely important to understand the nature of the service architecture and the related modularity (Voss & Hsuan, 2009). Voss and Hsuan (2009) define **service architecture** as "*the way that the functionalities of the service system are decomposed into individual functional elements to provide the overall services delivered by the system. At each level of decomposition, the architecture can be either integral or modular*" (p. 546). Thus, service architecture can be seen as an integration framework for combining modules (Böhmann et al., 2003; Tuunanen et al., 2012). The architecture specifies the modules and their functions in the system, and interfaces describe how the modules interact. The architecture of the system is often defined in the first steps and the interfaces in the second step (Baldwin and Clark, 1997 and 2000). Thus, the core of any platform is the organization of components and interfaces of which the product architecture consists (Mikkola, 2006). According to Ulrich (1995), in a modular architecture **interfaces** between components (or modules) are decoupled and there is a one-to-one mapping between physical components and functional elements. Two components are *decoupled* if a change made to one component does not require a change to the other component in order for the overall product to work correctly. On the contrary, in *integral* architectures, a change made to one component requires changes in other components, i.e. adaptations between the activities and resources between the actors (Brennan & Turnbull, 1999; Holma, 2013; Ramos et al. 2014).

In integrating and disintegrating business components, modularization can also help to increase efficiency by sharing modular components, either internally, or by outsourcing modular components to external suppliers (Janssen & Joha, 2008). Thus, supply chain modularity focuses on outsourcing, and how companies allocate different type of tasks among themselves, and how different actors interact with each other (Voordijk et al., 2006). Service delivery networks may expect modularization in order to be effective (Janssen & Joha, 2008; Voss & Hsuan, 2009; Campagnolo & Camuffo, 2010). The architecture of service company or supply chain consist of both upstream and downstream levels, thus the system needs to be decomposable (Voss & Hsuan, 2009). Based on Howard and Squire

(2007) modularised components expect collaborative sourcing practices in order to co-develop products and reduce constraints in the interfaces. Therefore, interfaces between outsourced parts should be well specified and standardized, which is a central focus in modularization strategies (Mikkola, 2007). When aiming to efficient outsourcing, knowledge of the process architecture of services and the interfaces between them is needed (Voss & Hsuan, 2009).

Our objective is to decompose the service architecture in the context of corporate travel management process. The aim is to explore how modular service architecture can support efficient switching of an intermediary in this specific context. In this study we use the term modularity in the following two contexts. First, we use modularity in decomposing the service architecture of travel management process (activity and resource level), i.e. we study if the modules can be decoupled. Second, we will study the link between service architecture and triad, and test if the focal service triad is modular (actor level), i.e. if one of the actors (in our case the intermediary) can be changed without causing connected change in the network i.e. representing *confined change* as described by Havila et al.1999. The modularity and efficiency of switching can be measured for example through time and costs associated on switching, evaluation of if the interfaces between modules are specified and standardized, and through the level of implications to operational travel process (to the travelers). Our pre-assumption is that if a service architecture is modular the triads (or networks) implementing it are inherently modular.

To conclude, decomposing service architectures and modularity approach are expected to be important elements in understanding the structures of service processes and in supporting efficient switching of an intermediary (supplier). Corporate travel is a relevant empirical context to study how modularity approach can be used, and how it could help in service management. Travel provision employs a complex network of actors and a number of diverse services, in which collaboration in the focal triad is essential.

METHODOLOGY OF THE STUDY

In order to understand the complex processes in service production and development, we chose to conduct a longitudinal qualitative case study. Prior studies call for longitudinal research on networks in understanding how specific relationships (Håkansson, 1982; Dubois & Gadde, 2002; Ford & Redwood, 2005; Smals & Smiths, 2012) and networks develop over time (Quintens & Matthyssens, 2010; Li, 2011; Partanen & Möller, 2012). Qualitative methods provide a depth and richness allowing the researcher to ask the how and why questions (Ellram, 1996). In network context case studies give a full and rich description of the relationships between a multitude of events and factors (Gummesson, 2001; Halinen & Törnroos, 2005; Cova & Salle, 2008; Quintens & Matthyssens, 2010). Case study method is useful in the early phases of research when little is known about the phenomenon or the current perspective seems inadequate (Eisenhardt, 1989; McCutcheon & Meredith, 1993; Ghauri et al., 2002). Case research can lead to new and creative insights and development of new theory. Furthermore, case research has high validity also for practitioners (Coughlan & Coghlan, 2002; Voss et. Al., 2002).

We applied action research (AR), a qualitative research practice where members of an organization are involved in a problem that is of genuine concern to them. Coughlan and Coghlan (2002: 238) call for collaboration among managers and researchers, which deal with intellectually interesting and managerially relevant operational realities by managers. According to Coghlan (2007: 336), issues of organizational concern, such as systems improvement, organizational learning and the management of change are suitable subjects for

AR. In AR, expert research knowledge and local knowledge are combined (Brydon-Miller et al., 2003). The action researcher has dual aims: to bring about improvements through making changes in a problematic situation, and to generate new knowledge (Gummesson, 2000; McKay & Marshall, 2001; Whyte, 1991). AR is a process that pulls together bundles of competences, skills, knowledge and technologies within an organization, and thereby creates new organizational capabilities (Eden & Huxham, 1996; Roth et al., 2007).

AR covers many forms of action-oriented research. In insider action research (IAR, also called participatory action research) some members of the organization being studied actively participate in the research process rather than are just the subjects of it (Eden & Huxham, 1996; Coghlan & Brannick, 2005). Our research team is a combination of insider and outsider researchers with different roles that complement each other, and add the validity and reliability of the results (Hales et al., 2006; Pereira et al., 2011). The 1st author is a researcher employed by the University, and has thereby a dual role as an end user of the investigated services, and as a researcher specialized in modularization, triads and SCM. The 2nd author is a researcher specialized in network research, business triads and business travel services. She also has an extensive practical experience, and thus preunderstanding (Gummesson, 2000) from the business travel industry. The 3rd author is an insider actor from the University's procurement unit, who has researcher background. The 4th author is a researcher with specialized in services. The combination on different backgrounds helps to tackle the dilemma of building closeness with the studied phenomenon, and, on the other hand, create distance in order to see things critically and to enable change to happen (Coghlan & Holian, 2007; Roth et al., 2007). The authors 1-3 in cooperation were responsible for the interviews, discussions, and writing memos and research diaries, and iterating the data. The 4th author acted as a neutral reviewer who commented the outcomes of the process in between the different phases (cf. Pereira et al., 2011).

We selected the case university due to the fact that it has taken a proactive approach to develop is services and service processes. Corporate travel services are a target for development in the case University mainly due to the complexity of the service offerings and the great variety of suppliers, providing thus a relevant problem to research (cf. Coghlan, 2007). Also, the need to switch intermediary was an actual challenge for the university's travel management. Combining research and service development supports the University's strategy: "*The University's own research and other expertise relating to services are harnessed more extensively than before when planning services*". The best method to harness the cooperation is to establish an action research project with a group of researchers with complementary knowledge, where the researchers are able to observe day-to-day practices and contextualize the collected data (Gebauer, 2011; Coughlan & Coghlan, 2002). Our research process followed the AR cycle with three types of steps as described by Coughlan and Coghlan (2002):

1. *A pre-step to understand the context and purpose of the project* included acquaintance with company reports, industry reports, and in-depth interviews with the contact persons in the most important external organizations involved in the service development, i.e. the travel management company (TMC), and the technology provider (TeP). Also the central procurement unit of Finnish Government that organizes the tendering of TMCs and other services was interviewed. The first interviews were conducted in February 2012. Research process continued until June 2015 with the following steps:
2. The main six steps, *data gathering, feedback, analysis, action planning, implementation and evaluation* relate to the main data, and to the action. Data was generated through active involvement in the daily organizational processes related to the development of the

case University's corporate travel services. We have also used other information sources, for example information publicly available and documents provided by the interviewees.

3. *Monitoring* is a meta-step that occurs through all the cycles. Continuous planning, implementation and evaluation takes place throughout the process as each research cycle leads to another cycle.

AR is applicable to the understanding, planning and implementation of change in organizations (Gummesson, 2000). The longitudinal approach allowed us to follow the service development process over 12 months. During this period, the case University changed the TMC partner, which provided us with a concrete context to analyze the modular architecture in triads, and answer to the call for longitudinal studies of network development pointed out by, for example, Quintens and Matthyssens (2010), Li (2011), Partanen and Möller (2012), and Hoang and Antoncic (2003).

AR is not compatible with the criteria for scientific explanation as stipulated in positivistic science (Susman & Everet, 1978; Gummesson, 2000; Coughlan & Coghlan, 2002), and the current debate on the quality of AR moves the focus away from the traditional notions of scientific validity, replacing it with trustworthiness, authenticity and quality (Martí & Villasante, 2009). The involvement of the organization in the analysis is important, because the members know what will work, and they are the ones that will implement and follow through the actions taken as a result of the research (Coughlan & Coghlan, 2002). Interpretation of the results and the implications based on the research involve the stakeholders, which are those best positioned to understand the processes (Brydon-Miller et al. 2003). Brydon-Miller et al. (2003:25) claim that AR is more able to product 'valid' results than ordinary or conventional social science. The insider researcher has an advantage of greater depth of knowledge about the organization and its resources. The outsider brings knowledge and analytical tools and objectivity to the evaluations (Roth et al., 2007). Furthermore, the validity and reliability of our research is supported by iterative AR cycles, in which researchers and practitioners have discussed in numerous meetings and small workshops. In action research, triangulation is not only a cross-checking method. The AR cycles provide the opportunity for cyclical data collection and their triangulation than a more controlled research (Eden & Huxham, 1996).

Action research generates emergent theory by synthesizing data, practices and theories. The theory building as a result of action research is incremental, and moves from particular to the general (Eden & Huxham, 1996). In the following, we will first analyze the focal service process in detail. The analysis creates the basis for modular service architecture of the process, which is applied to analyze the change of a module. However, before the analysis, we will describe the research setting.

DESCRIPTION OF THE TRIAD

Longitudinal case studies have been pointed out as a gap in the prior empirical triad studies (Holma, 2012; Wynstra et al., 2012). We had the opportunity to apply a longitudinal approach in our case study, because we had access to the actual counterparts in a triad, and a situation where the intermediary was changed during the research process. The buyer, Aalto University (later: University) purchases its travel services from one travel management company (later: TMC, which are also called business travel agencies) at a time**.** TMC is the service supplier that acts as an intermediary. The technology provider (TeP) offers services to TMC, and through TMC to buyer (see Figure 2). The buyer has an indirect relationship with the technology provider (later: TeP) and direct relationship with the TMC. Next we describe more in-depth the actors of the focal triad. We look at the triad from the focal company's, the

University's perspective. The University has a dual role in the triad; a service buyer, and the end user (customers, i.e. travelers are the employees of the University). This is a typical situation in indirect sourcing, which corporate travel services exemplify. This is in line with the description of Holma (2012) and van der Valk et al (2013); triads could comprise two types of customers: the buyer and the end-customer.

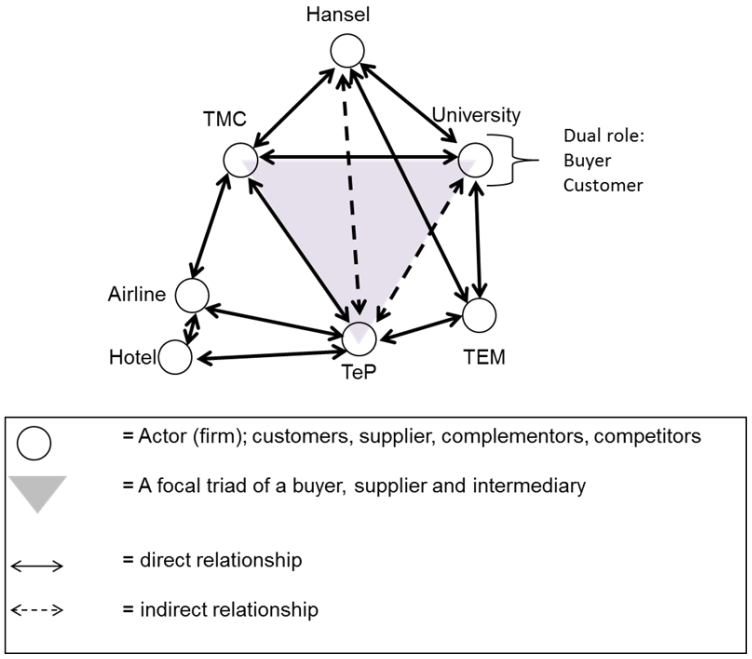

Figure 2. A focal triad embedded in the wider network.

The **buyer** of the travel services in a triad is a Finnish university with six schools in the fields of science, art, technology and business. In the case University, there are totally 12 970 students, and 5330 employees, of which 370 are professors. In the year 2012, the University's travel costs were 13.6 million euros. The yearly number of travellers is approximately 2 500, and they make about 20 000 business trips. The number of flights was about 6 700, of which majority (6 100) were international. The main travel motivation is research and teaching. There are two specific features in the University's corporate travel. *First*, the travelers are price and market conscious. They are also technologically skilled, which puts pressure on the quality of travel management. The outcome expectations for the travel services are cost efficient service product and service processes. The *Second* feature concerns the public procurement rules i.e. tenderings in short, few years, intervals, which can limit the ability to create partnerships that would allow long-term process development.

Public procurement is a challenge for many publicly funded organizations like the case University. Public procurement of goods and services affects both nations' competitiveness and inhabitants' well-being, and therefore a successful contracting and procurement is often an indicator of good management within government (Bof & Previtali, 2010). At the University, the procurement of travel and other services follows the rules given by national procurement legislation and the directives of the European Union. The rules define the procurement procedures, which consist of different phases in the tendering procedure. In order to increase the efficiency of procurement of products and services required for the public administration in Finland, a government owned central procurement unit, Hansel Ltd

has been set up. The case University takes advantage of Hansel's framework agreements in service and product procurement.

Travel management company (TMC) is a service supplier, which acts as an intermediary that provides a variety of travel and technology related services to the buyer. The buyer can outsource the whole travel management process, or parts of the process to the TMC. The University is sourcing travel arrangements from the TMC. This allows the University to concentrate on its core competencies, and save time and administrative costs by not being involved in service delivery. There are several features that have an impact on the University's strategic choices for corporate travel services. *First,* the service solution provided by TMC should be widely adapted, provide large sets of market options, and it should be cost efficient. *Second,* there should be a large variety of services available for global and local travel arrangements. *Third*, the TMC's services should include an e-solution with standard interfaces that fit to the University's operational travel management process.

The buyer, the University, can either use Hansel's framework agreement by negotiating a co-operation agreement with Hansel, or it can organize its own tendering process. Our study includes two phases in the University's service development process. *First*, when we started our research in the year 2012, the University had a co-operation agreement with Hansel (framework agreement for the years 2010-2012) concerning corporate travel services. This framework agreement had three travel management company candidates, of which the University had selected **TMC1**. *Second,* Hansel organized a tendering process in the year 2012 for the contract period 2012-2017. The tendering process resulted in framework agreements with three TMCs, and TMC1 was not among these options. After a thorough discussions with selected TMC's and analysis focusing on pricing, service offerings, contractual terms, and an evaluation of the TMCs' capabilities and competencies, the University decided to use Hansel's framework agreement. As a result, a co-operation agreement with Hansel was made and a new TMC was selected based on University's travel volume, service needs and set of rules defined in framework agreement. Finally the University negotiated a more detailed service agreement with **TMC2** including customer specific service definitions, service levels descriptions and operational details.

TMC1, the company that was earlier used for travel services had long history operating in business travel service market. TMC1 is a Finland based company, and a member of a world-wide partner network that covers a network of agencies in more than 140 countries. The number of employees was 150, and was specialized in corporate travel, individual business travel, meetings, congresses, incentives, group travels, sport tours, and fairs. The new **TMC2** is a globally operating company with approximately 15000 employees in more than 120 countries. TMC2 offer a full range of corporate travel related services including meeting and event management, expense management and related IT-systems. TMC2 has a strong focus on efficient business processes, reporting and analysis.

Technology provider (TeP) provides travel related electronic based technology solutions. TeP and TMC complement each other when providing services to the University. Electronic based reservation services in travel context are typically called global distribution systems (GDS). For TMCs the TeP provides solutions to automate service processes, for example, for issuing tickets, invoicing and book-keeping. The solutions can help TMCs in managing their clients' (buyers) travel policy, the travelers' profiles, and the use of corporate rates. For example, most flights booked through physical or online TMCs go through a GDS, which charges the airline a fee and passes a small amount of the fee to the TMC (The Economist, 2012). In Finland, the TeP and its GDS system has practically a monopoly in travel technology. The TeP is known for its wide service offerings and heavy technology support.

The University is not directly connected to the TeP because of the TeP's strategic decision has been to co-operate with TMCs only, and to take advantage of triadic relationships. The core of the TeP's business is providing technological solutions, and TMCs act as distributors of those solutions. At the other end, the TeP acts as an intermediary to the suppliers whose services are available via the TeP. However, despite the indirect relationship with the TMCs' customers, the TeP's sales person sometimes attends the service development negotiations. One example of such negotiations has been the traveler profile integration between M2 (buyer's travel and expense management system) and TePe-Travel Management. Thus, typical situation in the negotiations is when the University makes suggestions for the needed services and their development, and thereafter the TMC (or Travel and Expense management provider, TEM) in cooperation with TeP realizes the services. The actors in the travel distribution network are dependent on each other's resources, and the buyer specifically depends on the interactive relationships between the actors in realising the goals of an effective corporate travel management process (cf. Douglas & Lubbe, 2006).

In sum, in the triad, TeP does not provide services directly to the University, but only via TMC. However, TeP has interactive role in triad, because it is involved in service development in the focal triad. These aspects increase the complexity of the relationships in the triad and in the network to which it is connected, but provides potential for service development. Next we move on to more detailed description of travel service architecture.

DECOMPOSING THE TRAVEL SERVICE ARCHITECTURE: BUYER'S PERSPECTIVE

The aim of the service architecture is to support effective and efficient corporate travel. We will decompose travel service architecture into two travel management process levels: operational and managerial. We will first describe the travel management process at the operational level, and decompose it into *Travel Modules*. Secondly we will decompose managerial level processes into *Service Modules*. Managerial level service modules aim to support smooth processes at the operational level. These two travel management processes and their modules comprise the modular service architecture. Later on, we will link the modular service architecture to the focal triad to examine if the service architecture is truly modular when switching an intermediary in the focal triad.

Operational level Travel Modules

The operational level travel process consists of activities necessary for the traveler to plan and book travel, and for the employer to reimburse travel costs to the traveler. Finally, the operational level activities enable expense reporting. At the operational level, customers are the travelers, i.e. all employees at the University. Travel bookings are de-centralized, and booked by employees themselves, who are spread throughout the organization. Wynstra et al. (2006) categorize these kinds of services as business consumption services.

The architecture at the operational level can be decomposed to the following Travel Modules: travel plan, travel bookings, the trip, travel claim (payment), and reports (see Figure 3). These modules are sequential, which means that each activity needs to be completed in the predefined order. Modules are connected by interfaces. The *first Travel Module* mainly involves internal actors in the University. Travel plan starts with negotiations with the superior who gives the preliminary approval for the travel. The traveler, in co-operation with the superior, is responsible that there is adequate funding available for the travel. After the approval, the traveler prepares the travel plan to electronic (e-based) travel and expense management system, M2. This should be done well in advance before the travel and it is "officially" accepted via system. Thus there is a clear interface between the first module and

second module as the approval need to be in place before entering the second module. The *second Travel Module* follows the approval. The traveler is now able to book the trip with the TMC. In this phase the traveler interacts with the TMC (cf. van de Valk & Iwaarden, 2011), which is responsible for travel reservations systems and bookings.

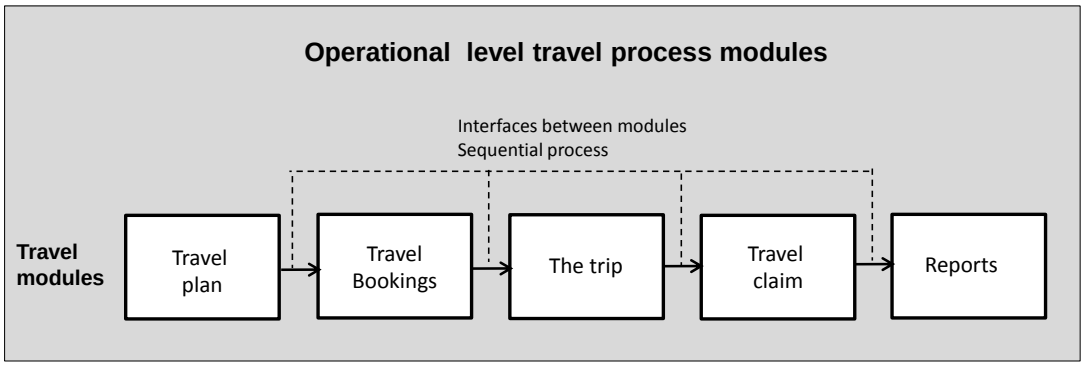

Figure 3. Operational level Travel Service Architecture: Travel Modules in operational level travel management process in the case University – travelers' perspective.

The *third Travel Module* is the trip, which is why the service process exists. The *fourth Travel Module* is the travel claim. To obtain reimbursement, the traveler prepares travel claim into the M2-system. This is expected to be done latest two months after the travel. Regarding the reservations made via TMC, the TMC charges the University directly through the travel account (a virtual credit card). After the reservation confirmation invoices are sent via email to traveler or travel secretary, and they are uploaded to electronic M2 system. All other documents and receipts related to the trip are scanned and attached in the M2 system in electronic form. This saves time for the traveler when preparing the travel claim, and improves the efficiency of process. When the travel claim is completed, the traveler sends it electronically to the approval process. The traveler receives the reimbursement after the claim is approved. All the information is forwarded electronically to the University's accounting and other systems (e.g. accounting archives). In overall, the electronic process and integration with other systems has increased the efficiency of the process for travelers compared to earlier process. To give an example, time spent from travel claim to acceptance and payment has shortened. In the last, *fifth Travel Module*, traveler is able to follow up all travels in the system and use reports from the M2, for example, to follow yearly total costs. The process also provides managers with reports to analyze and plan travel.

Managerial level Service Modules

The managerial level travel process is centralized in the case University, and the Head of Procurement is in charge of this function. This follows the definition of corporate travel provided by Douglas and Lubbe (2006) "*travel undertaken by the employees of a particular organization that has a substantial travel volume and where travel arrangements are generally managed and consolidated into a centralized function*". Furthermore, University's choice follows the findings of Gustafson (2012) and Rose (2008), where the buying organization has chosen to maintain a corporate travel manager. The university finds it highly important to keep process coordination and development in-house.

The managerial level decisions provide foundations for the efficient travel service process for the operational level Travel Modules. These decisions include buying or outsourcing of the Service Modules, tendering, contract negotiations, service agreements, management reporting and travel policy related issues. Potential outsourcing of Service Modules is a managerial

decision. Service agreements are put in place in contract negotiations. The outsourcing question is central in modularity, which, in turn, is connected to the network actors' ability to allocate different type of tasks among themselves (Voordijk et al., 2006), and to share their resources in a profitable way (Gadde, 2004). When decomposing service architecture at the managerial level, we take the operational level travel process and the Travel Modules as a starting point. Several travel related services are procured through Hansel tendering and framework agreements, for example booking channel services, travel and expense management system (M2, provided by Logium), payment card solution and travel insurances. In the service architecture the Service Modules consistent with the operational level Travel Modules are: Travel and Expense Management system (provided by M2), Booking Channels (provided by the TMC), and Payment Solutions (provided by Luottokunta/Nets: MasterCard). These are identified as the key modules supporting smooth and efficient travel process (Figure 4).

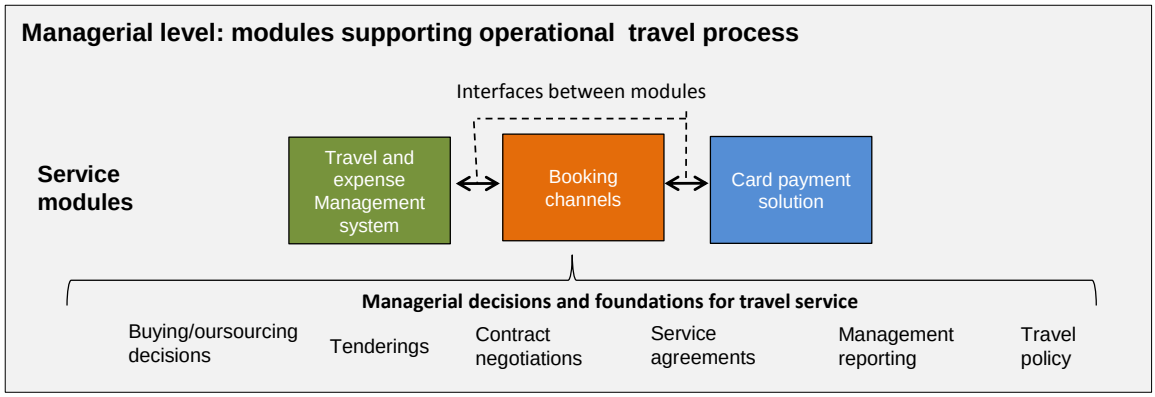

Figure 4. Managerial level Travel Service Architecture: Service Modules in managerial level travel management process in the case University.

Travel and Expense Management system module provides the buyer with management reporting, review and analysis to support outsourcing decisions. The information is also used, for example, in service development, and in quality and costs compliance. The information is gathered in co-operation with the actors in the travel management process (Holma, 2013). Even though it is expected that all travelers follow the travel policy and the given processes, monitoring travel policy compliance is important because the travelers have direct access to TMC (cf. van den Valk & Weele, 2011). *Booking Channels module*: The University buys services of the Travel Bookings (operational level Travel Module), for example flight bookings, from the TMC. Flights and other services can be booked via three key service channels: personal service channel (call center), e-mail, and online reservation system. For call-center and e-mail bookings, TMC has a dedicated service team for University's travelers. Online booking tool is built on the TeP's platform, and customized to the University's needs by the TMC. TMC's online booking tool is typically a standardized solution for all customers, however some customization is possible. For example, for the case University some customization has been done over what is included in the Hansel's framework agreement. These are availability of services from low-cost airlines and hotels, and modifications for priorities for listing flights, for example. According to the service agreement, the TMC clerks will permanently offer the cheapest means of travel, and tendered separate contract prices are suggested only if they are lower than the cheapest option. This process guarantees the requirements of the buyer – the expected service and cost efficiency level. From the service modularity perspective, travelers are able to mix and match different types of service products (sub-modules) to form an integrated customized travel package. E-

bookings is a new service channel option, and the number of e-bookings has increased during the last years.

Card payment solution module provides the buyer the platform for sharing credit cards to travelers, e-processing system for invoices, and management reporting. Card payment solution is contracted with one company at the time. Basing on travel guidelines, employees who travel on business several times per year can receive from the university a business travel credit card for their use. Traveler is allowed to use the card to cover expenses of business travel within the credit limit and approved sums. Regarding the travel bookings, University has given a travel account for TMC's use (credit card payments). In practice this means that when traveler books the flight, the traveler or travel secretary receives e-based travel confirmation, travel ticket, and travel payment information which is addressed directly to M2 system and later on to accounting system. Management analysis and reporting of costs could be easily done to follow the total payments.

TOWARDS MODULAR TRAVEL SERVICE ARCHITECTURE

In the figure 5 the decomposed operational and managerial levels and their modules are combined, comprising modular service architecture of the business travel process in the case company. As pointed out in the modularity literature, interfaces are of high importance (see e.g. Ulrich, 1995; Voss and Hsuan, 2009; Tuunanen et al. 2012). In the figure we show as well interfaces between operational and managerial levels, as interfaces between these modules. At the operational level, the interfaces between Travel Modules follow sequential process, meaning that the steps should follow a predefined order. At the managerial level, Service Modules support operational level Travel Modules, and do not follow sequential steps. Service Modules can be matched independently to each step at the operational level. The ways of how the interfaces between Travel Modules and Service Modules are managed has high importance.

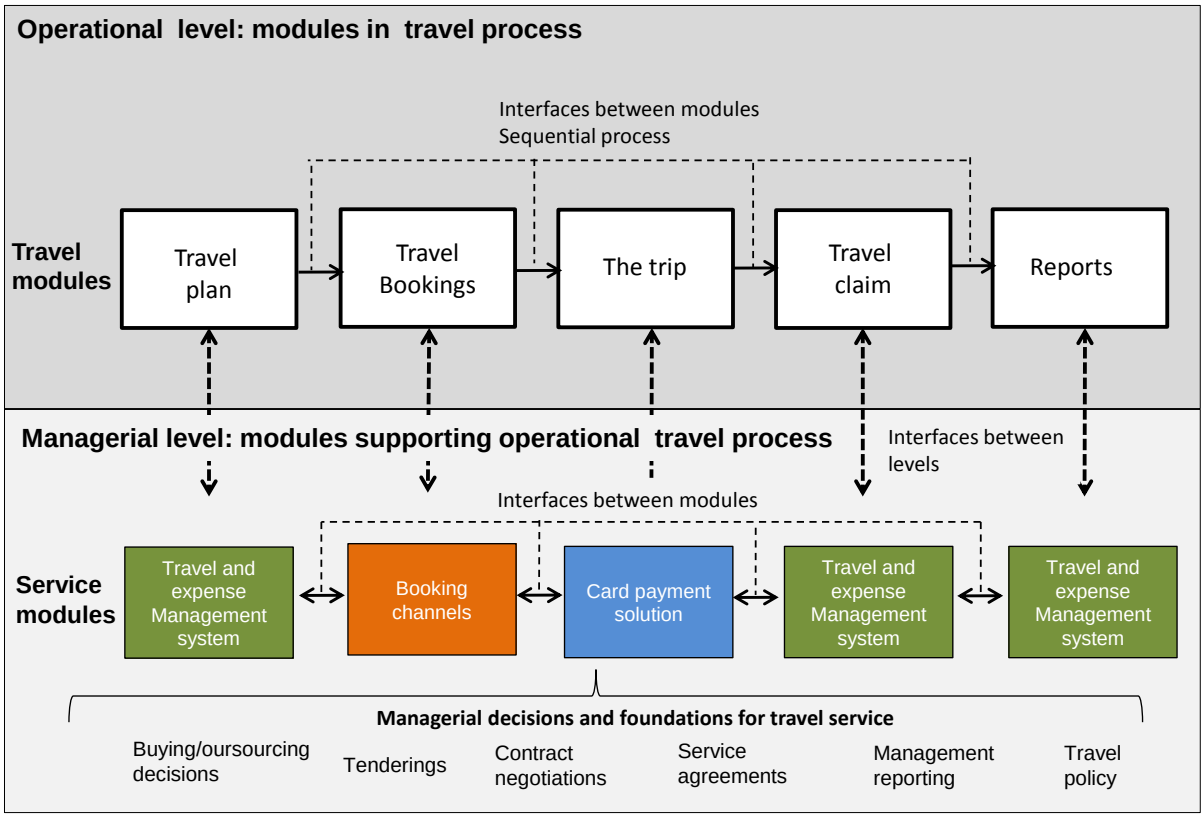

Figure 5. Modular travel service architecture of the case company.

SWITCHING THE BOOKING CHANNELS MODULE – TESTING THE MODULARITY OF THE SERVICE ARCHITECTURE

After decomposing the service architecture, we will now study whether the architecture is truly modular. As described earlier, in the "Booking Channels" Service Module, the University utilizes TMC's services, and we use this specific module as an example. In order to find out if the service architecture is modular, by taking the triad perspective, we will analyse the situation where the University switched TMC1 to TMC2 (see Figure 6). We mirror here the term modularity in the following two contexts: to describe the managerial level architecture, where each phase of the travel management process constitutes the modules, **and** the modularity of the focal service triad, where each of the three actors is seen as a module.

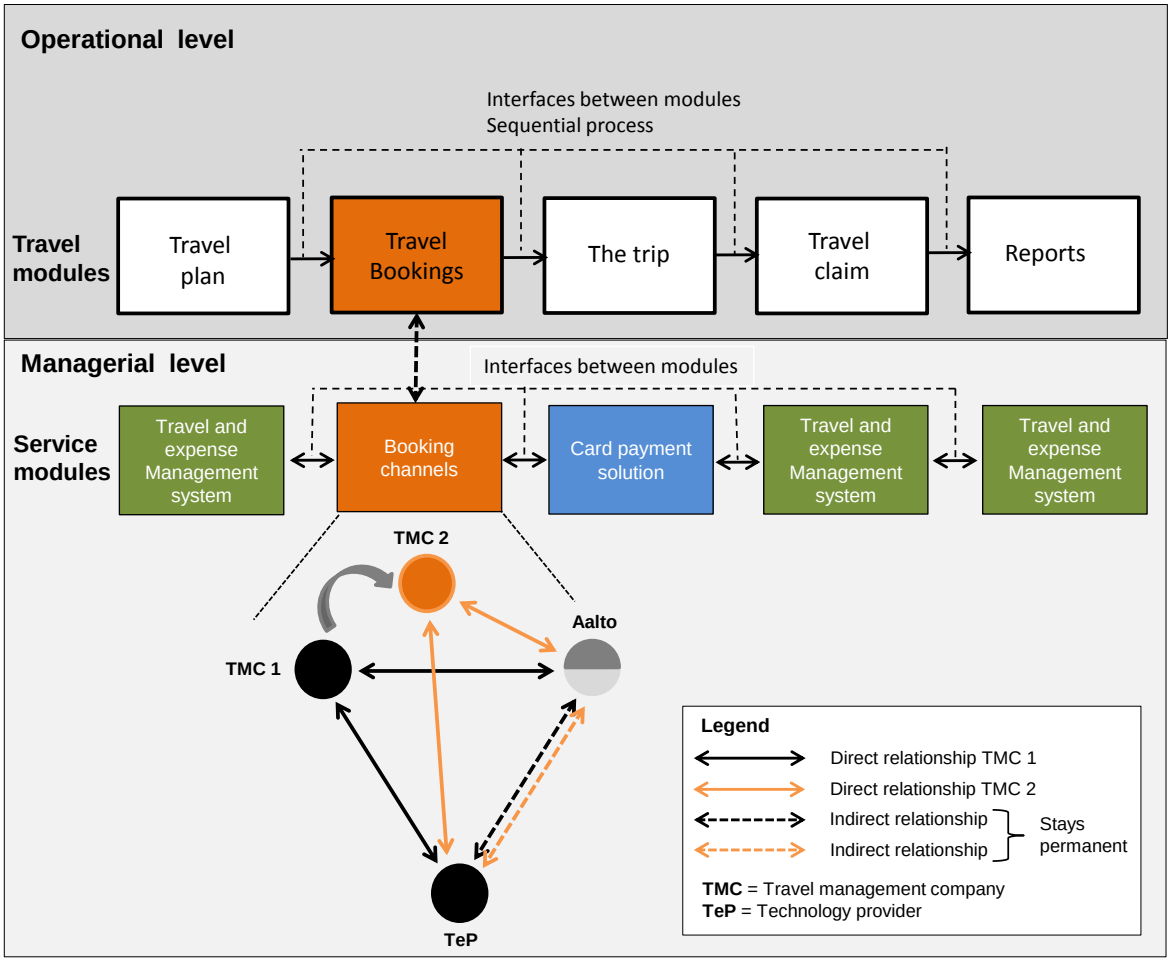

Figure 6. Modular travel service architecture and connected service triad.

Basing on the modularity literature we expect that if the interfaces between the Service Modules are clear and standard, changing the supplier of one Service Module should be easy and relatively straightforward and efficient. Travel Modules and Service Modules form activity chains, where the network actors share their resources (Holma, 2013). From the buyer's perspective, confined change (which stays within a dyad), instead of connected change (which affects the wider network cf. Havila & Salmi, 2000; Halinen et al., 1999) is desirable. Connected change might lead to change in the buyer's supplier network, i.e. ending of some of the relationships, and establishing new ones. Furthermore, changing a supplier should not have an impact on the operational level Travel Modules and thereby on the internal actors (travellers) taking part in travel management process. At both managerial and operational levels, the change should not cause major adaptations in the buyer's activities, in the resources that are allocated to the travel management, and in travellers' operational travel process.

For the University, change from TMC1 to TMC2 took only 14 effective working days. This included about five effective days of negotiations with the three TMCs preselected by Hansel, the Government owned central procurement unit. The evaluation and final selection between TMCs was based on the developed evaluation model which took into account the travel profile of the University. The travel profile includes e.g. the number of flights and hotels, bookings per channel per year. After the selection of TMC2, a service agreement was made describing the details of the service as service levels, reporting requirements and such.

When the agreement was signed and finished, an implementation phase started. This phase began with a kick-off meeting with all key persons. An implementation plan based on TMC2 standard implementation model was reviewed and modified to University needs. A weekly schedule including necessary teleconferences was agreed. Most of the tasks in the implementation plan were routine checks and IT-system configurations, such as customer hierarchy creation etc. There were two main activities that required specific attention. First, the University's traveler profile data link from M2 travel and expense management system to Amadeus' e-Travel Management (AeTM) system had to be redirected from TMC1 AeTM instance to TMC2 AeTM instance. This was done by first setting up a test connection between M2 testing database and TMC2 AeTM instance and ensuring that the configurations on AeTM were correct and the data flow was smooth. Second, travel account had to be created and tested on TMC2's systems. This required minimal work from the respective suppliers. Once the tests were complete, the actual handover was done over a weekend: on Friday the connection from M2 production database to TMC1 AeTM was disabled and the connection to TMC2 AeTM was enabled. This process went through flawlessly and travelers were able to do bookings immediately on next Monday with proper profile information in AeTM. This implementation phase took altogether nine effective working days over six weeks' period.

Additionally, information events and training were organized for travel secretaries to support the smooth switching process. At the operational level the change of TMC (the Booking Channel-module) did not cause any significant changes for the travelers: the phone number for offline bookings changed, but the online booking link in M2 systems stayed the same (only the actual https-link was redirected in background). Travel policy and instructions were updated, and travelers were provided information about the new TMC. Also, the travel booking channels remained the same (call center, email, e-booking). In co-operation with TMC2, some changes in online (GDS) offering was implemented, for example prioritizing cheapest flights to better support the travel policy and to provide better customer service for travelers.

We can conclude that understanding the modular service architecture and interfaces between travel process levels and modules, switching the module TMC1 to TMC2 was smooth and quick. Due to standard interfaces between the service modules, and in spite of the organization size (5000 traveler profiles), the smooth process was possible. Our case provides a good example and benchmarking case of modular service architecture, where changing one module (in our case the intermediary) to another did not cause changes in other service modules. In network terms, the change was confined (Havila & Salmi, 2000), and did not have an impact on the wider network and its actors. For the buyer, it was highly important that the change did not harm the travelers operational travel process and other internal actors' daily routines. Due to the modular service architecture the change was relatively straightforward, because the technology provider, TeP, travel and expense management system, and payment solution remained the same.

To summarize, by using common technology platforms and standardized interfaces, we expect that the buyer could change the intermediary easily, for example, through a tendering process, and still keep the process cost low and keep the service levels. The benefit for the intermediary is cost effective technology platform with large number of service providers (provided by TeP). We expect that the modular travel service architecture could be developed and adapted also at least to other services, which require e-solutions and cooperation with technology providers, and where the triadic relationship benefits the focal company. These types of services are typically standardized or routine type services with high volumes. In this type of service offerings, the intermediary and technology provider can focus on development

of their core competencies. However, the buyer needs to analyze carefully which type of service procurement could support the modular architecture. We also believe that understanding of the modular service architecture and service triads has potential advantages especially for organizations that need to follow public procurement legislation. The legislation mandates regular renewal of service contracts, which means supplier selection through tendering process approximately every four years. The modular architecture enables the tendering of one service module at a time. The service triad simplifies the tendering and the possible subsequent change of intermediary as long as the technology platform remains the same. Applying the modular service architecture and service triad approach can keep the costs associated to the tendering process and the cost of changing a supplier low, as our case of business travel services exemplify. Moreover, in addition to organizations that need to follow public procurement legislation, the modular network and modular service architecture could provide potential advantages also for private corporations.

CONCLUSIONS

The focus of this article was on service development in public procurement context. We took the buyer's perspective, and investigated how modularity was applied in the context of indirect sourcing. In our service triad, buyer (customer) played an active role, and used an intermediary to facilitate access to the suppliers. The constellation is interesting specifically from service modularity perspective, because the buyer and the supplier are permanent actors in the triad, while the intermediary is chosen on an open tendering process. The purchasing function in our study was investigated from two perspectives. First, we investigated the buyer as an organization that purchases corporate travel related services on behalf of its employees, which are the end-users of the services. Second, we investigated also the purchasing function from the end-users' operational process's perspective. Thus, our service triad involved two types of customers, i.e. the buyer and the end-customers (Holma, 2012; van der Valk et al., 2013). The first perspective included managerial level actions, which are related to strategic purchasing decisions, and the second level implies operational level interaction related to individual daily purchases. The aim of the managerial level is to support the operational level process. We included both these perspectives in our study, because they are intertwined, and both the buyer and the end-users provide their own input into the service management process (van de Valk et al., 2013). This kind of dual role in buyer organization is typical for indirect sourcing. The triadic constellation also enables the direct control function, which is absent, for example, in the service triads studied by van de Valk et al. (2013).

Our empirical context was corporate travel purchases, where the focal service triad consisted of the buyer, technology provider (TeP) and travel management company (TMC), which acted as an intermediary. We applied longitudinal case study and insider action research where the buying organization was involved. The problem that we focused on, organizing corporate travel service process in an effective and efficient way, is of genuine concern to the buyer, and to the end-users of the services, i.e. business travelers (Coghlan & Brannick, 2005; Coughlan & Coghlan, 2002). To be able to understand the travel service process we first decomposed the travel management architecture into Travel Modules and Service Modules. Then we linked modular travel service architecture and the focal service triad by illustrating the situation where the buyer switched the intermediary. Based on our analysis this focal service triad is truly modular, and the interface between the managerial and operational level is decoupled. This was also the case between managerial level modules.

Our study has several theoretical contributions and also managerial implications. First, combining the service triad concept and modularity approach provides avenues for theory

development, and helps the management and coordination of complex phenomenon. Second, our study adds to the emerging service triad research by increasing our understanding on how modular architecture and service triad was used for management of travel service process. Third, we have contributed the service triad research with a new type of service triad, where the buyer has a dual role. A further contribution is introducing modular service architecture into the business travel context and testing if the architecture was truly modular. The modular service architecture can be used for efficient management of service modules to support service delivery in a triad, and in wider networks. Managers can use the modular service architecture in supplier selection and management, and in developing efficient management of switching suppliers and management of operational processes. To summarize, our modular service architecture approach is useful in the context of indirect sourcing, specifically in public procurement context, where tendering processes are conducted regularly. For further research, one could apply and test the usability of the service architecture in other types of service purchases in other contexts.

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