

8-2010

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Recommended Citation

Lux, Johannes; Riempp, Gerold; and Urbach, Nils, "Understanding the Performance Impact of Enterprise Architecture Management" (2010). *AMCIS 2010 Proceedings*. 403.

<http://aisel.aisnet.org/amcis2010/403>

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Understanding the Performance Impact of Enterprise Architecture Management

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ABSTRACT

Enterprise architecture management (EAM) is becoming a widely accepted management approach deemed to improve, among others, the long-term development of organizations' IT and the performance of corporate IT functions. Profound EAM often requires a significant amount of financial and human resources. Therefore, practitioners and researchers alike aim to understand the mechanisms that lead to the desired benefits. However, the way in which EAM generates value is not yet sufficiently understood and the related research lacks a theoretical foundation. We argue that the resource-based theory (RBT) is well suited to explain the influence of EAM on the performance of corporate IT functions and present a framework that helps elucidate this impact. We report on a single case study that we conducted at a large professional service firm. The empirical results identify a first set of causal relationships between the theoretical framework's elements. The study's findings make it possible for practitioners to better understand the performance impacts of EAM. This work is part of ongoing exploratory research aimed at explaining the mechanisms through which EAM affects firm performance within a testable theory.

Keywords

Enterprise architecture, enterprise architecture management, resource-based theory, IS capabilities, IT value, organizational performance.

INTRODUCTION

Looking at information technology (IT) in a corporate context, we face the problem of aligning it with the business to enhance a firm's performance (Luftman and Brier, 1999). As a management discipline, enterprise architecture management (EAM) takes such a holistic perspective and provides a set of processes, structures, and tools to support an organization's planning and steering towards the optimal support of its business through IT. It focuses on the long-term development of the enterprise architecture (EA) in an enterprise-wide consistent and coherent manner (Kaisler, Armour and Valivullah, 2005; Lux, Wiedenhöfer and Ahlemann, 2008). EAM projects often require a significant amount of financial and human resources (Morganwalp and Sage, 2004). Moreover, in both private and public organizations, many EAM programs fail (Zink, 2009). Accordingly, companies need to know how much value they gain from EAM and whether their investments pay off.

The extant literature does not answer this question sufficiently. Consequently, there is still a need to establish the "theoretical foundations of EA benefits" (Kappelman, Pettite, McGinnis, Salmans and Sidovora, 2008). On the one hand, both researchers and practitioners have developed approaches for EAM, for instance, in the form of enterprise architecture frameworks such as TOGAF (Opengroup, 2009) or modeling approaches such as the Archimate Framework (Jonkers, Lankhorst, Buuren, Hoppenbrouwers, Bonsangue and Torre, 2004). On the other hand, researchers have worked on identifying the benefits associated with the implementation of EAM (Kamogawa and Okada, 2005; Kappelman et al., 2008; Morganwalp and Sage, 2004; Ross and Weill, 2005). However, the mechanisms that lead from EAM practice to benefits have not been sufficiently studied to date. The lack of a theoretical foundation becomes particularly apparent if EAM's causal relationships cannot be placed in an overall context. This prohibits EAM-induced performance improvements from being explained in respect of the firm as a whole.

By focusing on a central aspect of this overall problem, this paper contributes to answering the following research question: How does EAM impact the performance of IT/IS management in organizations? This article's contribution is twofold: (1) we

discuss how resource-based theory (RBT) can be applied as an underlying theory to explain EAM's performance impacts within organizations. As a preliminary result, we present a theoretical framework that forms a synthesis of the classical resource-based view (RBV) and the dynamic capabilities view (DCV); it structures our understanding of how EAM affects an organization. (2) We present a single case study's results, identifying a first set of causal relationships between the theoretical framework's elements.

This article proceeds as follows: The next section summarizes EAM's theoretical foundations and motivates using RBT as the primary theory base. We explain how we apply RBT in our research and how EAM is understood in this context. We then present a theoretical framework that reflects this understanding and helps structure the research problem. Subsequently, we explain the research process we chose to answer the research question and present the findings of our case study. To conclude, we summarize the paper's contribution and limitations and provide suggestions for future research.

FOUNDATIONS

We started our research by examining the existing research in the field and searching for theories that help answering our research question. In this section we depict our understanding of EAM, RBT and how EAM fits in the context of RBT.

Enterprise Architecture Management

EAM evolved as a discipline in the early 1990s after Zachman (1987) had applied architecture concepts, like holistic planning and documentation, from the engineering discipline to IS management. Since then, various concepts, methods, and tools have been developed that draw upon this notion (Aier, Riege and Winter, 2008b). EAM's objectives thereby are the documentation, analysis, and long-term development of the EA with a model-based, holistic, and enterprise-wide approach. The EA comprises both business and information technology/information systems (IT/IS) by mapping elements and relationships of business strategy and business processes as well as supporting IT/IS services, applications, and technical infrastructure in different states (e.g., as-is, to-be) (Aier, Riege and Winter, 2008a). While not used consistently in the literature, we refer to EA as the real object of investigation and EA models as its documentation. The focus of our investigation is on EAM as a management approach, not only on the EA models that intend to bring the EA from the current to a desired state (e.g. from baseline to target architecture (Opengroup, 2009)). This often includes the periodic development of a clear understanding of the current and desired EA – in models of a high level of abstraction – as well as the planning and implementation of its transition (Espinosa and Armour, 2008). Governance mechanisms such as enterprise-wide standards (Boh and Yellin, 2006) help to ensure that the EA evolves as it is planned.

Resource-based Theory and Value Creation of IS/IT

The set of applicable theories is determined by EAM as a management approach, and by our focus on its impact within a corporate IT function. Thus, we consider the relationship between the management and application of IT and the organizational performance. Among microeconomic, industrial, organizational, sociological, and socio-political theories that elucidate this subject (Melville, Kraemer and Gurbaxani, 2004), RBT appears most suitable to address our research problem.

Besides being a tool to identify sustainable competitive advantage, RBT is an efficiency-based theory of rents with performance differences “derived from rent differentials, attributable to resources having intrinsically different levels of efficiency” (2003, p. 311). Those efficiency differences are based on a broad view of “efficiency.” This view is concerned with either lowering costs or creating greater value/net benefits through superior resources. This notion has already been employed to inform about the value of IT in organizations (Bharadwaj, 2000; Santhanam and Hartono, 2003), thus providing a firm foundation for our endeavor. Moreover, the interaction between IT and other organizational resources has repeatedly been part of the resource-based discourse (Devaraj and Kohli, 2003; Powell and Dent-Micallef, 1997; Ross, Beath and Goodhue, 1996). Given EAM's firm-wide dependencies, this discourse can be helpful in understanding its impact, for example, on the business side in alignment issues. In addition, RBT can also integrate a management perspective with an economic one (Peteraf and Barney, 2003). Since our intention is not only to identify the impacts, but also to understand them, it is further helpful that RBT is a “useful tool for researchers to understand if, and how, particular parts of the firm affect the firm at large” (Wade and Hulland, 2004). Since RBT is not used consistently in the literature, we briefly present our understanding of it.

Wernerfelt (1984) refers to resources as anything which could be considered a strength or weakness of a given firm. In analogy to a product-based entry barrier, resource position barriers, i.e. imitation barriers, can lead to above-normal profit. In the early 1990s, Barney (1991) added that valuable, rare, inimitable, and non-substitutable resources may lead to sustained competitive advantage. Resources are classified into physical capital, human capital, and organizational resources. One of the first outcomes of IS research using the RBV is that investments in IT do not necessarily provide sustained advantages, but the

way in which investments are leveraged to create unique IT resources and skills does (Mata, Fuerst and Barney, 1995). The research stream of the DCV focuses on this phenomenon, describing a firm's ability to deploy resources in this manner as capability. Following Amit et al. (1993) and Teece et al.'s (1997) understanding, Makadok (2001, p. 389) defines a capability as an "organizationally embedded non-transferable firm-specific resource whose purpose is to improve the productivity of the *other* resources possessed by the firm." Following this definition, we distinguish between resources and capabilities. Resources are the source of capabilities, but they do not necessarily lead to capabilities; nevertheless, capabilities are limited by resources (Grant, 1991).

Studies on RBT offer various solutions in respect of a typology of IT-related resources. Consistent with other studies, we refer to Barney's (1991) basic classification of a firm's resources into physical capital, human capital, and organizational resources. Using this classification as our primary notion, we resort to the nomenclature by Melville et al. (2004) as well as Bharadwaj (2000), and use three categories of IT-based resources: (1) technological IT resources, (2) human IT resources, and (3) intangible IT-related resources. The distinction between technological IT resources (technology related, e.g., infrastructure) and human IT resources (employee related, e.g., technological skills) is common in studies on the RBV (Bharadwaj, 2000; Melville et al., 2004; Powell and Dent-Micallef, 1997; Ross et al., 1996). The third category is not used consistently regarding definition and terminology. However, many studies apply a third resource category, such as organizational resources (Barney, 1991), intangibles (Grant, 1991), IT-enabled intangibles (Bharadwaj, 2000) or complementarities (Melville et al., 2004). We use the term IT-related intangibles to stress the intangible character of these resources. Furthermore, following Melville et al.'s understanding, we assume that resources are IT-related if there are synergies between them and IT.

EAM in the Context of Resource-Based Theory

In our research, we focus on the explicit management of the EA with a dedicated EAM concept and program. An organization can adopt an EAM approach consisting of a set of normative constructs, such as policies, modeling guidelines or reference processes, for example, the "Architecture Development Method" of TOGAF (2009). Such an approach is transferable and does by itself not include the application of other resources. It is therefore classified as a resource acquired by the firm. According to Bharadwaj, this resource refers to a firm's knowledge asset and belongs to the category of IT-enabled intangibles (Bharadwaj, 2000). Enterprise architects can acquire knowledge of the chosen EAM approach and extend their skills through EAM seminars and conferences. These new skills represent human IT resources that are directly related to EAM. Investments in architectural tools are classified as technological IT resources. However, a firm's ability to efficiently align, run, and develop its EA is considered a capability. Consistent with our definition above, this is the conjoint application of several resources: an EAM capability not only comprises the concepts, architects, tools, etc., but their appropriate adaptation, complementation, and application within the firm. Consequently, an EAM capability is non-transferable, firm-specific, organizationally embedded, and addresses the deployment of other resources.

A FRAMEWORK FOR EAM IMPACTS

On the basis of theoretical considerations, we developed a framework (Figure 1) that defines our research's boundaries and relevant factors. It is a critical application of existing theories within a new context that challenges the distinct perspectives of resource picking and capability building, leading to an altered framework that combines resources and capabilities to explain their value generation in organizations. Melville et al. (2004) summarize how the value-generating process within a firm is understood from the resource-based view. They incorporate all relevant aspects within their Integrated Model of IT Business Value. Applying our understanding of a synthesis of the DCV and the classic RBV, we use this framework as a basis and incorporate an organization's IS capabilities that represent a "special resource" (Makadok, 2001). The capabilities thereby correspond to a conjoint application of other resources and determine how far the organization can exploit the resources. In the remainder of this section, we present the framework's elements by explaining their background in RBT, their role in the value generation process, and the corresponding EAM aspects.

EAM-related human IT resources (a): Human IT resources refer to a firm's employees and their skills, such as their training, experience, relationships, etc. Generally, the literature also distinguishes between technical IT skills and managerial IT skills. This classification dates back to Capon and Glazer (1987) and has been used in various IS studies (Bharadwaj, 2000; Mata et al., 1995; Ross et al., 1996). According to Mata et al. (1995), human IT resources can particularly be a source of competitive advantage. Santhanam and Hartono (2003) empirically confirm that there is an implicit link between human IT resources and firm performance. IT managers and enterprise architects acquire EAM-related skills through seminars, conferences, and literature. These skills thus represent EAM-related human IT resources. These may include modeling skills for architectural models and the skills necessary to utilize EAM tools. Furthermore, firms invest in external EAM-related human IT resources, such as consultants to implement EAM or undertake maturity assessments.

EAM-related technological IT resources (β): Technological IT resources comprise IT infrastructure resources and business applications. Various studies examine the relationship between technological IT resources and organizational performance; some utilize an aggregated measure (Brynjolfsson and Hitt, 1996), while others focus on specific information systems (Hitt, Wu and Zhou, 2002). Although some studies find inconclusive evidence, most researchers in this area have demonstrated a positive association between technological IT resources and organizational performance, for example, through cost reduction (Hill and Scudder, 2002) or enhanced transaction processing (Weill, 1992). In the context of EAM, technological IT resources play an important role, as they form a large part of an organization's EA. They are the basis of many EAM-related tasks such as as-is analyses. EAM-related technological IT resources, in which firms invest, are mainly tools used to document the EA and support the architects in their daily work.

EAM-related intangibles (γ): The third category refers to the intangible organizational resources that are complementary to IT. These include policies and rules, organizational structure, workplace practices, organizational culture, as well as a firm's intellectual capital or knowledge assets, such as information repositories (Bharadwaj, 2000; Melville et al., 2004). In this category, the resources are widely recognized as potentially unique, inimitable, and valuable (Matusik and Hill, 1998; Prahalad and Hamel, 1990). Matusik and Hill (1998) further point out that the relationship between organizational knowledge and competitive advantage is moderated by the firm's ability to integrate and apply such knowledge, which indicates the importance of a holistic and integrative approach such as EAM. Intangible resources related to EAM are the concepts and guidelines of the adopted EAM approach, as well as the knowledge assets, such as the documents and information repositories created in a firm applying EAM.

EAM capability (δ): Capabilities can be difficult to identify, since they are deeply embedded in an organization. Day (1994) therefore suggests analyzing the processes in which capabilities are employed in order to identify them. In order to do so, we refer to the definition of an *EAM capability* as the appropriate use of the acquired EAM-related resources. Thus, an EAM capability is based on the processes in which a firm applies its EAM resources; examples are those processes in which it utilizes, updates, and propagates EA models and standards. An EA development cycle as described in the procedures of approaches like TOGAF (Opengroup, 2009) or FEAF (Office of Management and Budget, 2007) regarding how to plan the way towards a to-be architecture is an example of such processes. RBT argues that only the implementation of such processes can lead to the desired benefits of an EAM program. To date, researchers and practitioners have struggled to understand the full impact of EAM practices and how they create business value. Nonetheless, the literature already informs us about the benefits expected from EAM efforts. These benefits range from improvements of broad strategic characteristics – such as the increased ability to change (Hoogervorst, 2004) and innovate (Kamogawa and Okada, 2005) or strategic agility (Ross and Weill, 2005; Stutz, 2007) – to more specific advancements like reduced development time (Kappelman et al., 2008; Ross and Weill, 2005) or reduced costs through consolidation, standardization, and the reuse of IS (Boh and Yellin, 2006; Morganwalp and Sage, 2004; Ross et al., 1996). The diversity of benefits adds to the difficulty of understanding and communicating the EAM's value proposition as a whole. On examining the nature of these benefits, we came to the conclusion that EAM seldom has a measurable direct impact on business processes, but rather affects several key management issues. We therefore argue that from the high-level perspective which RBT helps us adopt, an EAM capability's impact is not direct but rather indirect.

To explore EAM's impact, we therefore have to study its effects on *other IS capabilities (ϵ)*. There is a rich set of previous studies in IS research that explores the effects of IS capabilities in firms; these studies can be used as a reference to evaluate EAM's business value. Wade and Hulland (2004), for example, reviewed earlier research and deliver a set of eight IS capabilities consisting of: IS infrastructure, IS technical skills, IS development, cost effective IS operations, IS business partnerships, IS planning and change management, external relationship management, and market responsiveness. With reference to the earlier example of an EA development cycle, one has to acknowledge that such an EAM method would be integrated into the existing application planning of the firm. Consequently, the building of an EAM capability – and, thus, an EAM program's success – also relies on the existing other IS capabilities. We therefore have to consider this influence when studying EAM's impact.

Additionally, a firm's capabilities are by definition limited by the availability of resources. Therefore, EAM capabilities and other IS capabilities are all influenced by the existence of traditional IS resources, which are subsumed as *other IS resources (ζ)* for reasons of simplicity. These resources include human IT resources, technological IT resources, and IT-related intangibles which were explained earlier.

Business processes and organizational performance: Resource-based theory informs us about the further process of value generation. Value is created for a business by deploying its IT resources and capabilities within the business processes. The latter are the locus of direct resource exploitation (Melville et al., 2004). The application of IT-based resources can improve business processes or enable new ones. This can impact the business process performance, which ultimately impacts organizational performance. While the former is associated with operational efficiency enhancements, such as process cycle

time, the latter denotes aggregated IT-enabled performance impacts, such as cost reduction or productivity enhancements (Melville et al., 2004). Our focus is on examining the first part of this causal chain in order to understand the role EAM plays in it. However, the acknowledged relationships between specific resources and the ultimate organizational performance goal help us interpret the impact of EAM-related resources in the overall context.

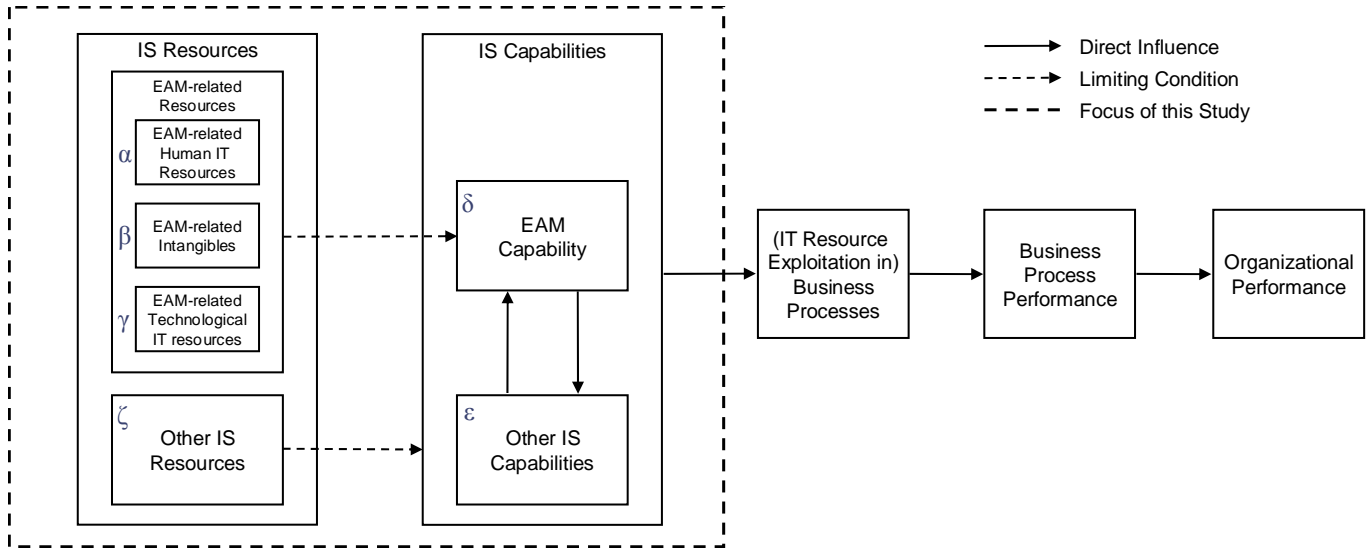


Figure 1. Resource-based Framework for EAM Impacts (based on Melville et al. (2004))

We conclude that our framework integrates EAM in the value-generation process of IS resources from RBT's theoretical lens. EAM is a management discipline that can be applied in an organization to create an EAM capability. Firms invest in EAM-related resources to exploit them to generate value. The exploitation of these resources within the setting of existing other IS resources and other IS capabilities leverages the firm's EAM capability. In other words, with a dedicated EAM program in place, firms expect to run and develop their EA better in the long term. This EAM capability (δ) relies on EAM-related resources, such as enterprise architects (α), and EA tools (β) a dedicated EAM approach (γ). It determines the degree to which the EAM-related resources enhance the organization's performance. The EAM capability can be accessed through the processes that constitute it. An improved EAM capability may influence a firm's IS capabilities (ϵ) in many ways and, vice versa, is influenced by existing IS capabilities.

RESEARCH PROCESS

Our research follows Eisenhardt's (1989) theory-building process. Owing to the lacking theoretical basis of EAM impacts in the literature, we specifically address the first stage of Eisenhardt's theory-building process. This process includes elaborating on the research question to ensure a well-defined focus and the definition of a priori constructs to help shape the theory's initial design and allow for more accurate measurement in the field. We therefore developed the presented framework, which is based on logical-deductive reasoning and a literature review. It allows us to structure the process and to ground any form of performance impact on a rich set of previous studies in the RBT field. At the same time, the theoretical framework and the underlying logic help us to identify a first set of constructs to structure our problem into three main steps:

Step 1: The EAM-related resources within a firm need to be identified.

Step 2: The processes that form the EAM capability and exploit those resources need to be examined.

Step 3: The impact of the EAM-capability on the IS capabilities needs to be studied.

We investigated our research problem within an exploratory, qualitative research design. We chose case study research, since our goal is to study EAM as a contemporary phenomenon in practice and because EAM implementations in firms tend to show no clear contextual boundaries (Yin, 2003). Although we investigated the research question and developed a framework that structures the problem, we still make no assumptions about the causal chains that we aim to identify within the framework's structure. Thus, our case studies have an exploratory design and our aim is to explain and understand

phenomena rather than confirm theoretical assumptions. Using our three-step approach as the guiding structure, we developed an interview guide that was applied throughout all the cases. Data validity was ensured through multiple sources of evidence and a discussion of interpretations with the interviewees. At least two researchers participated in each interview in which up to two interviewees were present. The interviews were recorded and subsequently transcribed for within and cross-case analyses.

The next section presents the results of the first case study, which is part of an ongoing research project within a series of ten cases. The case study was conducted at the German subsidiary of a leading international professional service firm with over 9,000 employees. The IT department consists of approximately 250 employees and manages a portfolio of 400 to 450 IT applications. The EAM initiative was launched in 2007 and is in parts still in development. We conducted three interviews with two enterprise architects, one IT service manager, and one IT employee with a rather technical perspective on architecture.

EMPIRICAL FINDINGS

The gathered information delivered insights into how EAM is implemented in the firm. We could identify EAM-related resources, EAM capabilities, and their impact on other IS capabilities. In the following, we summarize these findings and formulate causal chains that rely on the structure and connections of the a priori constructs in our framework.

EAM-Related Resources

- *EAM-related human IT resources (α):* There are two general enterprise architects, as well as three architects who are specialized in certain topics. The EAM team is located at the CIO office, which is separate from the IS development and operations offices. Investments in EAM-related human IT resources include time spent on the development of general concepts and modeling issues, as well as impulse-giving external consultancy.
- *EAM-related technological IT resources (β):* The firm employs ARIS IT Architect as an EAM tool and modeling repository. The reasons for selecting the tool were its compatibility with other modeling efforts within the company and its modeling functionality.
- *EAM-related intangibles (γ):* The EA is structured according to an EA framework initially based on international specifications and on the structure of the Federal Enterprise Architecture Framework's reference models (Office of Management and Budget, 2007). Further intangible resources acquired for and utilized in the EAM efforts are the modeling rules and techniques implemented in the tool and additional reference models serving as guidance, such as TOGAF (Opengroup, 2009).

EAM Capabilities (δ)

- Within this setup of EAM-related resources, the enterprise architects developed a firm-specific metamodel and captured the existing IS landscape and its linkage to the business within the tool. According to our definitions above, these developments represent a capability due to the firm-specific application of other resources. However, to study EAM's impact, we do not focus on the preparatory tasks, such as the initial modeling efforts, but on the subsequent operating EAM.
- Architects utilize the EA's consistent documentation to guide the development of IT applications. They are involved in the preparation of strategic decisions as well as in the execution of the plans. The first contact they have with new development projects is when they review the demands and ideas that lead to the project proposals. Later, one architect attends the most important portfolio and budget planning meetings and offers information on the dependencies and risks regarding the rest of the IS landscape.
- Regarding the actual execution of the application portfolio plans, the architects utilize two standardized documents to verify the sound development of any software architecture. An architect has a consulting role in a project team and ensures those two documents are correctly created and that the project complies with standards and the IT strategy. The enterprise architects utilize the EAM tool to view the project's overall context.
- The architects also maintain information regarding who is responsible for the key applications. Based on the architects' initiative, the sponsor on the business side and the person responsible for operating the systems on the IT side are identified in respect of each core application.

Impact on Other IS Capabilities (ϵ)

- From the enterprise architects' perspective, the project management process for IT projects is an important process to control the IS landscape's development. They therefore seek to constantly optimize its outcome. So far, mainly architects use the models in the EA repository. However, the EAM team believes that the EAM's placement within an overall context improves the decision making within projects and lowers the risk of redundant technology use. The team thus plans to increase the use of EA models within IS projects. The EAM program also affects governance aspects of project management: Without the two architectural documents, which also include a diagram of the EAM tool, a project cannot fulfill the internal compliance requirements.
- EAM also affects strategic considerations. Although this is not established on a regular basis, the EAM team reports on the IS landscape to the CIO to support IS portfolio decisions. The EA reporting is still immature, but has already delivered a high-level overview of the business support – which could not be done earlier – through the core IT applications. Together with the input during project portfolio and budget planning meetings and the periodic preparation of strategic topics, such as technology outlooks, the management support of the EAM initiative is expected to improve the quality of the IS planning decisions.
- Interestingly, consolidation of the IS portfolio is not a major EAM goal in the case. The company we investigated aims more at optimizing the developed solutions for the business. The development of technology stacks by enterprise architects and the accompanying standardization are done more for agility reasons than for cost reduction. The IT organization has no cost pressure due to a large amount of redundant systems, but wants to lower its maintained landscape's complexity.
- The clarification of those who are responsible for core IT applications is undertaken in collaboration with the service managers, as they manage the operation of the applications and need the business sponsors to negotiate the service level agreements. The list of core applications with the information gathered by the enterprise architects is not only a crucial reference for the service management, but also identifies the link from strategy to operations.

To summarize, various causal chains could be identified that indicate a relationship between the elements of the framework. The enterprise architects (α) apply EA models and architectural compliance documents (γ) within projects to improve the development process (ϵ). EA reports (γ) created in the EA tool (β) are used for project portfolio planning and budget decisions (ϵ). An EA standard catalogue (γ) guides application developments towards an agile application planning (ϵ). The standardization impact is dependent on the existing application landscape (ζ). The content of the EA models (γ) also has an impact on the IT service management (ϵ). The useful application of α , β , and γ and establishing the relationships to ϵ represent the firm's EAM capability (δ).

DISCUSSION

This paper aims to explain EAM's impact on organizational performance. We used the RBT to explain EAM's performance impacts on IT/IS management. Based on the resulting framework for EAM impacts, we argue that companies invest in EAM-related resources to increase the capability of managing their EA. This EAM capability is constituted by the practices implemented in companies and also affects other capabilities. Consequently, the impact is rather indirect and the benefits are not generated by EAM itself, but by it helping to solve key management issues.

This notion was applied in a case study to explore the causal chains of how EAM impacts the organization. The identified resources are used on various occasions and are often a tool for aiding the communication between the relevant stakeholders. The resulting benefit is the improved quality of traditional processes, namely project management, project portfolio management, IS operations, and service management. The process improvements originate from the new information basis generated by EAM and the appropriate use of EA artifacts, tools, and skills in the processes' key steps, such as compliance checks in development projects. We can only present limited results due to this paper's scope. The maturity of the EAM program of the company studied also suggests further investigations at a later point in time to ascertain if new causal chains emerge and if the benefits can be more precisely measured.

The case has shown that the principles of resource picking and capability building are helpful for analyzing an organization's EAM efforts, as they allow the elements of an EAM initiative to be structured and the benefits for a firm's other IS capabilities to be mapped. This perspective helps practitioners understand EAM's benefits and delivers insights into the investments that should be made in EAM (resource picking) and how to integrate EAM into their organization (capability building). Furthermore, the identified dependencies and causal chains contribute to theory development, which might need subsequent confirmative research. However, since the results are based on a single case, they are only preliminary. An analysis of additional cases will deliver further details for a testable theory.

Our research also contributes to the advancement of RBT. Although we apply the traditional resource typology to the EAM resources in our framework, we make a distinction between EAM-related resources and other IS resources. A further elaboration of this principle towards architectural resources and non-architectural resources, their nature, and properties could be useful. Such a new typology of resources could help us understand the use of resources in firms. We plan to further investigate this subject in our ongoing research. In addition, we also make a theoretical contribution by demonstrating how RBT can be applied to explain a specific management approach's performance impacts and its implementation in organizations. This is in line with recent research which has pointed out that a shift within RBT research towards individual initiatives could provide important new insights (Doherty and Terry, 2009).

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