Business-IT Alignment Improvement in Co-creation Value Networks: Design of a Reference Model-Based Support

Samaneh Bagheri(✉), Rob Kusters, Jos Trienekens, and Paul W. P. J. Grefen

Industrial Engineering Department, Eindhoven University of Technology, 5600 MB Eindhoven, The Netherlands
{s.bagheri, r.j.kusters, j.j.m.trienekens, p.w.p.j.grefen}@tue.nl

Abstract. Prior research has not adequately addressed business-IT alignment (BITA) improvement, especially in a business network situation of a co-creation value network (VN). In a VN setting, IT is regarded as a major facilitator of actors' collaboration to realize their joint objectives, i.e. to deliver seamless customer experience through providing mass-customized integrated solutions. To effectively use IT, a sufficient degree of BITA for key capabilities of a VN is required. Furthermore, BITA as a moving target should be improved continuously over time.

In this paper, BITA improvement in a VN setting is studied. We focus on BITA improvement for the key capabilities of a VN and design support for it. To this end, we adopt a dynamic capability perspective due to its ability to explain how organizations can improve their operational capabilities and processes to adjust to a changing environment. We design a reference model-based approach that enhances the 'business process management' dynamic capability of a VN by enabling co-development of business processes with their supporting IT-based systems. This co-development facilitates BITA improvement. This paper presents the research process of the design of our support. As a proof of concept, the results for one of the key capabilities of a VN (i.e., customer understanding) is presented and discussed.

Keywords: Business-IT alignment improvement · Reference model
Key capabilities · Co-evolution · Dynamic capability
Co-creation value network

1 Introduction

Alignment of business and information technology (BITA) continues to be an important challenge for firms [1, 2]. Furthermore, BITA is a moving target due to changes in the organization's external and internal environments. It means that BITA should be continuously improved over time [2–5]. Achieving better BITA may be even more challenging in a co-creation value network (VN) setting where a set of autonomous actors collaborate to accomplish their joint goal (i.e., co-creating mass-

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customized integrated solutions). BITA improvement in a VN setting is difficult due to the complexity of this context, such as lack of central decision maker, complex inter-organizational business processes, and diversity of working environments of the actors [6–8]. Co-creation value implies delivering a seamless customer experience by providing integrated solutions in which value is defined by or with the customers [9, 10]. As the provision of integrated solutions is often beyond the resources of an individual firm, multiple firms together with their mutual customers collaborate in the context of VN to access to complementary resources [11]. In a VN setting, IT is regarded as a major facilitator of collaboration [12]. To achieve business values of IT, a sufficient degree of alignment (fit) between the business side and IT side of a VN is required [1, 3, 4]. BITA improvement entails a more efficient use of IT among actors of a VN, contributes to sustaining a profitable collaboration, and facilitates joint value creation [6, 7].

While the earlier literature on BITA typically concentrated on alignment at one point in time, addressing a continuous process of BITA improvement has received much more attention in recent studies [7, 13, 14]. BITA improvement can occur when the business side and the IT side co-evolve [2, 5]. By taking into account this co-development, BITA improvement has been investigated from a theoretical perspective of dynamic capabilities [7, 13]. However, this literature does not explain how a dynamic capability with the aim of BITA improvement can be systematically developed. Additionally, in this literature, there is a lack of explanation on how to co-develop business with IT.

In this paper, we look at BITA improvement in a VN setting and aim to design support for it. We focus on BITA improvement for the strategic areas of key capabilities of a VN. If the degree of BITA for key capabilities is low, a VN will struggle to achieve its shared goals [15]. Key capabilities are used for implementation of key business processes. IT-based systems can facilitate this implementation. To continuously improve key business processes with their supporting systems, a business process management (BPM) dynamic capability is necessary [16]. Furthermore, the development of both capabilities (i.e., operational capabilities for process execution) and dynamic capabilities (i.e. abilities to improve operational capabilities) can be facilitated by organizational learning [17–19]. In this regard, Zollo and Winter [17] introduce a capability development model in which the role of the learning is highlighted.

We use this model as a basis to design our support for BITA improvement. According to Zollo and Winter [17], organizational learning starts with the accumulation of experiences. However, it is a time-consuming process. With the aim of BITA improvement, we provide a specific addition to this model. To accelerate learning, we propose a reference model-based approach which is to the best of our knowledge is new. We suggest identifying, classifying, and using, systematically, relevant external knowledge from literature which can accelerate/kick-start the learning process. In doing so, we will design and use reference models. In general, a reference model refers to a generic abstract conceptual model that describes essential elements of a particular domain. It helps to establish a common understanding about that domain [20, 21].

Following design science as a research approach, we design and evaluate a reference model-based approach to support the enhancement of the ‘business process management’ (BPM) dynamic capability. We argue that reference model-based

learning process can enhance the BPM dynamic capability. This dynamic capability can support the co-development of key business processes with supporting IT-based system. It can thus facilitate BITA improvement. As a proof of concept, the results for the key capability of customer understanding is presented and discussed.

The outline of the paper is as follows. Section 2 describes related work. Sections 3 and 4, respectively, explains research setting and the research design. Research results are described in Sect. 5. Discussion and conclusion are presented in Sect. 6.

2 Related Works

While prior research has typically focused on BITA as an event at one point in time, addressing a continuous process of BITA improvement has received much more attention in recent studies [7, 13, 14]. In this regard, BITA improvement has been investigated through a theoretical perspective of dynamic capability with an emphasis on co-evolution of business with IT [7, 13, 22].

The dynamic capabilities theory is mainly concerned with the intentional change in a firm's capabilities and business processes [17, 19, 23]. The term dynamic capability refers to learned and stable pattern of activities for systematically improving business processes [17]. Three examples of works from a review of recent literature on BITA improvement from the dynamic capabilities perspective are given here. By conducting a longitudinal case study, Chen et al. [5] provide snapshots of alignment across time and link this to the dynamic capabilities of IT acquisition, integration, and reconfiguration. Schwarz et al. [24] by focusing on dynamic capability, investigate the effect of BITA on firm performance. Baker et al. [13] emphasize the dynamic nature of BITA improvement and propose an approach to measure a dynamic capability that aims at BITA improvement. From this review, we have identified three points:

1. The main focus is on strategic BITA, e.g., alignment between strategic goals of the business and IT. However, these studies do not explain how strategic objectives can be realized.
2. There is a lack of detailed explanation of how a dynamic capability which aims at BITA improvement can be developed. The current literature only highlights the importance of a dynamic capability for BITA improvement, in general. But research lacks an understanding of a specific dynamic capability and the mechanisms which underpin its enhancement.
3. Although the co-development of business and IT has been emphasized in this literature, there is a lack of research that explains how to do this systematically.

In summary, the prior studies on BITA improvement from a dynamic capability perspective have provided useful insights into the general role of a dynamic capability. However, very little is known about how a dynamic capability with the aim of BITA improvement can be enhanced. It is also unclear how the co-development of processes with their supporting IT-based systems can be carried out.

3 Research Setting

A research setting of this study is specified by making four choices: one on context, two on theoretical perspective, and one on scope selection within the second theoretical perspective.

Firstly, as our focus is on BITA improvement over time, we are looking at a specific type of a VN which can be characterized as a longer-term (opposed to temporary) and reasonably stable collaborative environment [25]. The reason for this is to provide time to learn and improve. In that setting, actors closely work together based on longer-term shared goals and a shared understanding of the way to achieve their joint goals.

Secondly, we look at BITA from a capability-based theoretical perspective with a focus on key capabilities [26]. The reason for this focus is that the central premise of the BITA literature is to prioritize IT efforts for key capabilities effectively [15]. Firms that target IT initiatives in their key capabilities are likely to realize higher value from their IT than those that are less focused on their IT deployment [4, 15, 27]. The strategic significance of key capabilities, which are fundamental to a firm in realizing its business objectives, has been discussed in a capability-based theory [28, 29]. The term "capabilities" refers to the firm's abilities to perform business processes, i.e., day-to-day operational activities, to turn a current profit [23].

Thirdly, BITA improvement has been studied from a theoretical perspective of dynamic capabilities. By taking into account co-development of business and IT, the dynamic capability theory has been considered a suitable perspective from which to study BITA improvement [2, 5, 13, 22].

Fourthly, there are some concrete dynamic capabilities, such as product development [30], process re-engineering [17], and BPM [31]. For the purpose of this study, we focus on the BPM dynamic capability, which is dedicated to business process improvement [31, 32] and which supports both incremental and radical improvement [31].

In summary, with a longer-term view of collaboration in a VN setting, we look at a BITA improvement in the key capabilities of a VN. Key capabilities are used to execute key inter-organizational business processes that can be supported by IT-based systems. Value networks need to improve and update their BPM dynamic capability which will allow them to continually improve their key business processes and their supporting IT-based systems [16]. We design support to enhance this dynamic capability.

To provide a clear structure for our discussion on BPM dynamic capability, the well-known model of Zollo and Winter [17] is used (Fig. 1). This model describes the systematic enhancement of dynamic capabilities by learning mechanisms. It should be noted that this model was developed from a perspective of a single organization. However, given that learning is a generic process, the logic of capability development by learning is transferable and applicable to the network settings such as VN [33].

Regarding the first learning mechanism; i.e., experience accumulation, organizations can learn from their own experience as well as from the experience of their network partners by accumulating experience over time [34]. Learning from experience

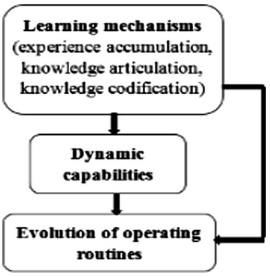

Fig. 1. Capability development model [17]

accumulation thus could be a time-consuming process. To accelerate learning, we propose a reference model-based approach which is to the best of our knowledge is new. We argue that reference model-based learning process can enhance the BPM dynamic capability. This dynamic capability can support the co-development of key business processes with supporting IT-based system. It can thus facilitate BITA improvement.

4 Research Design

The objective of this paper is to design a reference model-based approach to support BITA improvement for the key capabilities of a VN. A designed support will enhance the BPM dynamic capability by enabling the co-development of key business processes and their supporting IT systems. We step from BITA improvement to co-development. This choice is supported by literature. It has been acknowledged that co-development of business and IT can lead to BITA improvement [2].

Our reference model-based approach is designed by following a design science. Design science research is an iterative approach for the design and evaluation of an artifact, where steps in the iteration take both relevance (i.e., importance for the application field) and rigor (i.e., alignment with the academic state of the art) into account [35, 36]. As illustrated in Table 1, our reference model-based approach consists of step 4 supported by steps 1 to 3. From step 1 to 3, we design and evaluate a reference model for a particular key capability. In step 4, we design and evaluate a process that uses a reference model with the aim of BITA improvement. It should be stated that step 4 and the other steps are independent.

Step 1: Identifying Key Capabilities of a VN. As specified in the research setting, we focus on BITA improvement for the key capabilities of a VN. The key capabilities are identified in a structured way from literature. This is done by following a systematic literature review (SLR) approach as suggested by [37]. The identified key capabilities are then classified and described in a structured way by using a structured classification approach in Metaplan sessions [38]. (Full information of this step is presented in one of our previous papers [39]).

Table 1. A reference model-based approach to support BITA improvement

Steps for the design of a reference model	Design of a process to use a reference model
Step 1: Identifying key capabilities of a VN Step 2: Selecting a specific key capability and identifying its key business processes Step 3: Designing and evaluating reference models in relation to the key business processes of the selected key capability	Step 4: Designing and evaluating a reference model-based user requirements elicitation process for co-development of key business processes with their supporting IT-based systems

Step 2: Selecting a Specific Key Capability and Identifying Its Key Business Processes. To be able to design a concrete reference model, we should specify it for a specific key capability. Considering a generic reference model would be unlikely to be adequately precise and meaningful to be used to design support for BITA improvement, and as a consequence, no concrete proof of concept could be expected.

Given that capabilities are embedded in business processes [17, 23], and in order to provide a base for developing reference models, key business processes of the selected key capability are identified. To achieve this, an SLR is conducted.

Step 3: Designing and Validating Reference Models for the Key Business Processes of the Selected Key Capability. To develop the reference models, we do not follow an experience accumulation approach as suggested by Zollo and Winter [17]. Instead, we develop them by introducing outside knowledge, i.e. from literature. We develop and validate our reference models by following this methodology:

- Design phase:
  - Conducting an SLR: By doing this, sufficient relevant knowledge of prior studies is identified systematically.
  - Structured classification: By conducting structured classification in Metaplan sessions, the identified information from literature is classified in a reference model.
- Evaluation phase:
  - Evaluation of the validity of the designed reference model by conducting multiple case studies.

Step 4: Designing and Applying a Reference Model–Based User Requirements Elicitation Process. We design a process to use the reference model with the aim of co-development of key business processes with their supporting IT-based systems. To do this, we focus on the user requirements elicitation process of IT-based systems. The development of IT-based systems should be derived from the requirements of business processes. The success of those systems depends on how well they meet user requirements. If systems functionalities properly meet user requirements, the business and IT will be aligned better [6, 40, 41].

Until now, the majority of user requirements elicitation studies with the aim of addressing BITA were based on a pure asking strategy [42, 43]. According to Davis [44], the asking strategy is aimed at relatively simple situations that provide users with

a well-defined structure to support requirement identification. A co-creation value network setting is usually more complex [8, 45]. To compensate for the limitation of the asking strategy in a more complex situation a VN setting, using it in conjunction with other elicitation strategies, e.g., a reference model strategy, is required [44]. A reference model strategy, by providing additional structure and by supporting for asking focused and more-detailed questions, can help in to deal with the added complexity caused by the VN setting.

Accordingly, we design a reference model–based user requirements elicitation process of the IT-based system which aims to improve BITA by addressing a set of recognized elicitation problems (e.g., weak knowledge of application domain, communication flaws) [46]. To do so, two-phase research according to the design science approach is followed. In the design phase, a reference model-based user requirements elicitation process is designed [47]. The combinations of asking strategy with a reference model strategy are used to design our artifact. The reference model strategy is realized by means of a particular reference model and the asking strategy is realized by means of a particular elicitation technique. In the evaluation phase, the applicability and usefulness of the designed artifact for the co-development is evaluated in case studies.

5 Research Results

The results of our designed reference model-based approach (Table 1) are presented here. To demonstrate the feasibility of the approach and as a proof of concept, the results of one of the key capabilities, i.e., customer understanding is also explained.

Step 1: In our previous work, the key business capabilities of a VN were identified from literature and classified in a structured way. They are customer understanding, partnership, trust-based interaction, engagement, design, and delivery of integrated solutions, knowledge management, and process orchestration and coordination [39].

Step 2: As mentioned above, in this paper, we focus only on the key capability of customer understanding. The importance of this key capability is emphasized in literature. As, an in-depth understanding of customer needs is regarded as a first step towards delivering seamless customer experience [48, 49]. To identify key business processes of customer understanding, we realize that this capability is an abstract construct and needs further conceptualization. Therefore, we used the concept of customer knowledge management in a VN setting (VN-CKM), because customer knowledge is essential for understanding and expression of customer needs [48, 50]. In order to get the right customer knowledge to the right people at the right time and to handle it systematically, firms in general and VN specifically should have the capability to manage their customer knowledge. We thus focused on this VN-CKM capability. In our prior work, the VN-CKM key processes were identified from literature. They are customer knowledge creation, storage/retrieval, transfer, and application processes [51].

Step 3: Two concrete reference models, respectively, the VN-CKM process and the VN-CKM challenge reference models, were designed and validated. The reason for creating these two types of reference models was that when talking to people about their tasks and roles, talking about abstract objectives and goals would have been too difficult. But talking about the things people do and the problems and barriers that affect their work would be much easier. Consequently, developing a reference model which describes the business processes or challenges will be aligned with topics that people can easily talk about. Thus, we expected that the VN-CKM process and the VN-CKM challenge reference models can be understood by people and are likely to be used by them. In our prior works, these reference models were designed and validated [52, 53]. In the VN-CKM process reference model, the four key processes of customer knowledge management in a VN are characterized regarding their sub-processes activities, control, and outcome (Table 2).

Table 2. Example part of VN-CKM process reference model [52]

Process	Sub process	Activity	Control		Outcome
			Formal	Informal	
Knowledge creation	Tacit-tacit (Socialization)	Contextual understanding of customer experience and problems, socializing in relaxed environments	-	Briefing sessions; reciprocal interactions; dialogues	Mutual understanding of customer problems in the context of usage, Increasing social cohesion in a network

In the VN-CKM challenge reference model (Table 3), challenges in relation to knowledge exchange in a VN setting are classified into five challenge areas and 28 challenge types.

Table 3. Example part of VN-CKM challenge reference model [53]

Challenge area	Challenge types
Network Structure Challenges	Transactive memory
	Relationship
	Complex network
	General distance
	Cultural distance

Step 4: A reference model–based user requirement elicitation process by using a Delphi technique was designed (Fig. 2). A theoretical justification of the selection of a Delphi technique is presented in one of our previous papers [47].

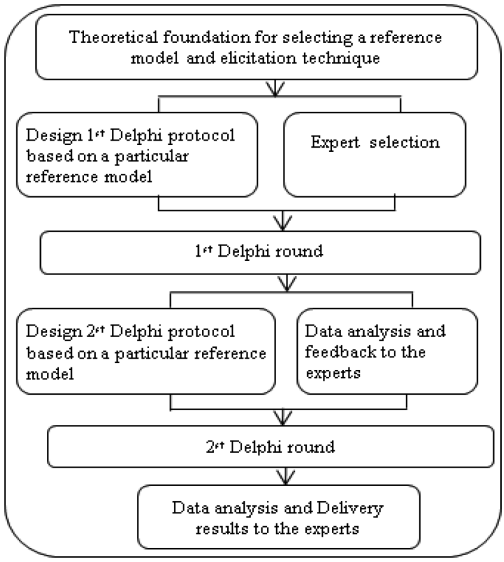

Fig. 2. A reference model–based user requirements elicitation process

According to the structure of a Delphi technique, eligible participants should be selected based on specific criteria. A two-round Delphi session are guided by Delphi protocols which are based on a reference model. While the first round is for individual brainstorming, the second round is for verification of the results of the first round, and for justification of the expert's opinion based on a controlled feedback (Further information is presented in one of our previous papers [55]). Based on the advantages of using a reference model (e.g., a template for communication, creating a shared understanding) and the benefits of a Delphi technique (e.g., eliminates undesirable group effects, and support asynchronous communication) our artifact was designed to address one class of elicitation problems in a VN setting. These problems as suggested by [46] are: weak knowledge of application domain, communication flaws between the project team and users, terminological problems, users with difficulties in separating requirements from previously known solutions, missing traceability, incomplete requirements, and inconsistent requirements.

We also designed two instances of this artifact, respectively, based on the VN-CKM process reference model and the VN-CKM challenge reference model. Their applicability and usefulness in dealing with the elicitation problems were evaluated in two separate studies. The two elicitation problems of 'communication flow' and 'weak domain knowledge,' which addresses well by the empirical data, are also acknowledged as the two main barriers in achieving better BIA [1, 54, 55]. We can thus conclude that our designed artifact contributes to dealing with these BIA problems and thus contributes to the BITA improvement. We thereby contribute to enhancing the BPM dynamic capability of a VN. Furthermore, during evaluation phase, participants came up with suggestions for improvements of VN-CKM processes and their supporting IT-based systems. Those suggestions indicated the viability of our designed

artifact for the co-development, which can thus enhance the BPM dynamic capability of a VN and support BITA improvement.

6 Discussion and Conclusion

The usefulness of the dynamic capability approach for BITA improvement has been highlighted in literature [7, 13, 22]. This literature also notes that co-development of business and IT can support BITA improvement. However, little is known about how a specific dynamic capability, i.e., BPM, with the aim of BITA improvement can be enhanced and how it can enable the co-development.

To contribute to these research gapes, we looked at BITA improvement from the dynamic capability perspective and focused on BITA for the key capabilities of a VN. We used the Zollo & Winter's model to explain how the BPM dynamic capability of a VN can be enhanced (Fig. 1). We provide an addition to this model by including a reference model which can accelerate/kick-start the learning process. Based on a design science research approach, we design a reference model-based approach to support BITA improvement in a VN setting (Table 1).

As a proof of concept, in this study, we focused on the key capability of customer understanding and developed and used two relevant reference models for that, i.e., the VN-CKM process and the VN-CKM challenge reference models. To provide comprehensive support for BITA improvement for all strategic areas of key capabilities of a VN, we suggest that future research will develop reference models for the other key capabilities of a VN. Furthermore, alignment initiatives in a VN setting involve considerable complexity and can take substantial time to improve. Thus as BITA improvement is a long-lasting effort, due to time restrictions of this research, we could not evaluate the actual improvement of BITA in practice. The results of evaluation of the proposed approach provide a good indication of the overall validity, applicability, and usefulness of this artifact. However, more empirical investigation, especially through conducting longitudinal case studies, can enhance the confidence in the findings.

Our reference model approach presents a novel perspective and contributes to the ongoing discussion of BITA improvement in a VN setting. However, we do not claim that the process-based and challenge-based reference models and the Delphi elicitation technique are the only options available. Other types of reference models (e.g., goal-based reference model) and other types of user requirements elicitation techniques might be useful as well, and should be investigated in future studies.

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