Towards a Dynamic IS Function

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Abstract

With the growing importance of IS for organizations and the continuous stream of new IT developments, the IS function in organizations becomes more critical but is also more challenged. For example, how should the IS function deal with the consumerization of IT or what is the added value of the IS function when it comes to SaaS and the Cloud? In this paper we argue that IS research is in need of a dynamic perspective on the IS function. The IS function has to become more focused on building and adapting IS capabilities in a changing environment. We discuss that there has been an overreliance on the Resource Based View so far for understanding the IS function and capabilities and introduce Dynamic Capabilities Theory as an additional theoretical perspective, which has only been limitedly addressed in IS literature yet. We present a first conceptualization of the dynamic IS function and discuss IS capabilities frameworks and individual IS capabilities from a dynamic perspective. These initial insights demonstrate the contribution of a dynamic perspective on the IS function itself.

1. Introduction

The IS function should enable the organization to continuously derive and leverage business value through IS/IT. A continuous stream of new hardware and software, such as smart phones, social media, software-as-a-service (SaaS), and cloud computing should provide opportunities for the IS function to drive IT-enabled business innovation, but the opposite seems to be true according to publications in the trade press. For example, The IT department of IBM (consisting of 5000 people) struggled with the adopted a 'bring your own device' (BYOD) policy and now focuses on controlling the use of personal devices (Bergstein 2012). SaaS and cloud computing is often introduced as 'shadow IT' by business users instead of IT departments proactively supporting it (McKendrick 2012). Moreover, while the business is open to new IT-enabled solutions that can stimulate innovation, increase performance and decrease cost, the IS function is struggling to become a strategic partner for innovation. For example, McKinsey's IT survey in 2010 states that "while many organizations express basic satisfaction with their own IT departments, new hurdles face IT executives as business units are demanding more value from the function. C-suite leaders are pressing IT executives for gains from transformational technologies like cloud computing,

and they want IT to help turn growing stores of corporate data into information assets that support growth and guide innovation" (McKinsey 2010).

In this paper we argue that the IS function is in need for a more dynamic perspective upon itself. The continuous changing technological and business environment, both inside and outside the organization, does not only result in changes to the products and services of the IS function, but also to the role and business of the IS function itself. To deal with the technological and business changes and to keep on adding value for the business, the IS function needs to continuously assess and, if required, adjust its core competences. The need for a dynamic IS function has been recognized earlier in IS literature, for example Zmud (1984) notes that information systems activities, which are the tasks associated with acquiring, deploying, and managing information technologies, are in a considerable state of flux in many organizations and discuss a number of evolving information system roles.

Within the IS disciple, the dominant theoretical foundation for strategizing about the IS function and capabilities is the resource based view (RBV). Strategic management literature has extended the resource based view with dynamic capabilities to move from a static perspective to a dynamic perspective. While dynamic capability theory (DCT) has had a little exposure in the major IS journals, it has so far not been applied to the IS function itself. In this paper we set out to present some first ideas about the development of an applied dynamic capability theory for the IS function. We first briefly introduce the IS function, IS capabilities and the resource based view. Then we present an overview of dynamic capability theory as introduced in strategic management and as applied in the IS discipline so far. This is followed by a discussion of the IS function and IS capabilities from a dynamic perspective.

2. Defining the IS Function and capabilities

The information systems field can be defined in two ways: (1) by the observed information systems and (2) by the function or field of activity for planning, developing, managing and evaluation those systems (Davis 2000). The focus of this study is on the IS function, which we see as an organizational ability of the organization with the 'objective of enabling an organization to continuously derive and leverage business value through IS/IT' (Peppard and Ward 2004). This is broader than the structural arrangement for IS in the form of separate organisational units within an organization, i.e. the IS departments and/or groups (Saunders and Jones 1992). According to Myers et al. (1997), the success of the IS function depends on service quality, system quality, information quality, use, user satisfaction, individual impact, work group impact, and organizational impact. Guillemette and Paré (2012) differentiate between five different ideal profiles for the IS function based on the primary mission:

- Partner: Aims to be an active partner in business transformation and innovation

- Systems Provider: Aims to supply systems that support organization's needs

- Architecture Builder: Aims to reduce architectural complexity to gain business agility

- Technological Leader: Aims to derive new IT-based strategic opportunities

- Project Coordinator: Aims to develop a sourcing strategy that will create business value

The dominant theory from a managerial and strategic perspective on the IS function is that of the Resource Based View (RBV). Resources are the 'assets and capabilities that are available and useful in detecting and responding to market opportunities or threats' (Wade and Hulland 2004). Based on Sanchez et al. (1996), Wade and Hulland define assets as 'anything tangible or intangible the firm can use in its processes for creating, producing, and/or offering its products (goods or services) to a market' and capabilities as 'repeatable patterns of actions in the use of assets to create, produce, and/or offer products to a market.' The notion of organizational resources can be extended to the IS resources (Bharadwaj

2000) and, by applying a similar reasoning, we can refer to IS assets and capabilities. From now on we will position the IS function as a bundle of IS capabilities.

RBV focuses on how organizations can gain competitive advantage by differentiating themselves in their collection of resources (heterogeneity) and how they can sustain competitive advantage by virtue of the inability of other firms to obtain comparable resources (immobility) (Barney 1991). RBV is useful for the IS field as it can help to understand how information systems relate to firm strategy and performance, in particular to evaluate the strategic value of information systems resources and to differentiate among various types of information systems (Wade and Hulland 2004). Many IS articles based on RBV identify IS resources (assets and capabilities) and study their relation with competitive advantage or firm performance (e.g., Bharadwaj 2000; Bhatt and Grover 2005; Ravinchandran and Lertwongsatien 2005). Wade and Hulland (2004) review the IS resources identified in literature and provide a typology based upon the work of Day (1994): *inside-out* capabilities (IS Infrastructure, IS Technical Skills, IS Development, and Cost Effective IS Operations), *outside-in* capabilities (External Relationship Management and Market Responsiveness), and *spanning* capabilities (IS-Business Partnerships, and IS Planning and Change Management).

Feeny and Willcocks (1998b) argue that RBV should not just be applied to the organization but also to the IS function itself to address the question of what core IS capabilities are required for organizations to exploit IS assets successfully. Feeny and Willcocks (1998a; 1998b) and Peppard and Ward (2004) set out to provide comprehensive frameworks for the capabilities of the IS function. Feeny and Willcocks (1998b) combine the learning about IS capabilities from two different directions: organizations that see IS as a strategic resource and organizations that focus on IS outsourcing. They identify three enduring challenges for IS that form the starting-point for their framework: business and IT vision, design of IT architecture, and delivering of IS services. This results in nine core capabilities for the IS function: Leadership, Business System Thinking, Relationship Building, Architecture Planning, Making Technology Work, Informed Buying, Vendor Development, Contract Facilitation and Contract Monitoring

Peppard and Ward (2004) base their capability framework on conventional business-IT alignment models extended with the exploitation of IT by the organization. They stress the need to have a wide perspective on the IS function as the successful exploitation of IT transcends the boundaries of organisational IS units. In line with Marchand et al.(2000), Peppard and Ward see the behaviour and values for effective information use as crucial. Based on Peppard et al. (2000), Peppard and Ward (2004) discuss the following capabilities for the IS function: Formulate Strategy, Define the IS Contribution (IS strategy), Define the IT Capability (IT strategy), Exploitation, Deliver Solutions and Supply.

3. Dynamic Capability Theory

The RBV was criticized for focussing on achieving competitive advantage by using existing resource configurations as changes in the environment can render strategic decisions obsolete (Teece et al. 1997). Dynamic Capability Theory (DCT) was introduced as an expanded paradigm to overcome this shortcoming by addressing strategic issues such as skill acquisition, learning, asset reconfiguration, or, more general, rapid and unpredictable change (Teece et al. 1997). The focus moved to 'dynamic capabilities' with 'dynamic' referring to the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece et al. 1997). Dynamic capabilities focus on changing an organization's ordinary or 'operational' capabilities (i.e., 'how we earn a living now') and are different from change through ad hoc problem solving as they involve patterning of activity and long-term commitments to specialized resources (Winter 2003). Helfat and Winter (2011) argue that the line between dynamic and operational capabilities is unavoidably blurry and as change is always occurring to some extent, the difference between more and less radical change is hard to define, less radical change may

also have important dynamic characteristics, and some capabilities can be used for both operational and dynamic purposes.

A number of different approaches to understand and analyse dynamic capabilities in more detail have been proposed. Helfat and Peteraf (2003) note that both operational and dynamic capabilities evolve over time. To articulate the general evolution path and patterns of organizational capabilities, they propose the concept of the capability lifecycle (CLC) consisting of the founding, development and maturity stages, similar to the experience curve. This lifecycle has six branches: retirement, retrenchment, replication, recombination, redeployment and renewal. Dynamic capabilities can play a special role in the capability branching and transformation, e.g. renewal capabilities can make the renewal branching process proceed more effective and efficient. Ambrosini, Bowman and Collier (2009) suggest that there are three levels of dynamic capabilities: incremental, renewing, and regenerative. While incremental and renewing capabilities utilize and leverage the current resource base, regenerative dynamic capabilities evaluate and adapt the overall portfolio. According to Teece (2007), dynamic capabilities can be differentiated in three different classes: sensing, seizing and transforming. There are capabilities to sense needs or opportunities for change, capabilities to seize these needs and to create new solutions, and capabilities to transform or reconfigure the organization using these new solutions. Pavlou and El Sawy (2011) extend Teece's work (2007; 1997) and differentiate between sensing capability (i.e., 'spot, interpret, and pursue opportunities'), learning capability (i.e., 'revamp existing operational capabilities with new knowledge'), integrating capability (i.e., 'embed new knowledge into operational capabilities with collective sense-making'), and coordinating capability (i.e., 'deploy tasks, resources, and activities in reconfigured operational capabilities').

Having introduced DCT based on the strategy and management literature, the next question is what has been the status of DCT in IS literature so far? To get a first impression, we searched the Senior Scholars' Basket of Journals of the Association for Information Systems (AIS)[1] for the articles with dynamic capability/capabilities in title or abstract till 2011 via Proquest and ScienceDirect. This resulted in a total of 22 articles with most publication in Information Systems Research (7), followed by the European Journal of Information systems (5). So we can conclude that DCT, while already quite popular in strategy and management literature, has not been widely adopted yet in papers that are published the major IS journals, as opposed to its predecessor RBV. While these DCT articles contain relevant ideas and approaches for the IS function and capabilities, none of the previous research has specifically addressed the IS function itself from a dynamic perspective. Below we will provide a brief overview of some of the related work.

The first explicit use of dynamic capabilities in the major IS journals was in 2002 and stimulated by a major change in the business and IT landscape: the rise of e-business. Wheeler (2002) proposed 'the Net-Enabled Business Innovation Cycle (NEBIC) as an applied dynamic capabilities theory for measuring, predicting, and understanding a firm's ability to create customer value through the business use of digital networks.' The main thesis of NEBIC asserts that Emerging/Enabling Technologies (ET) lead to Economic Opportunities (EO). Selected opportunities can enable growth through Business Innovation (BI) for the purpose of creating Customer Value (CV). Daniel and Wilson (2003) set out to identify dynamic capabilities that are necessary for the innovative or integrative aspects of e-business transformation and that can be considered as 'best practice.' Their e-business transformation dynamic capabilities relate to developing and formulating strategy, developing and evaluating business cases, building commitment to strategic change, developing customer value propositions, reconfiguring the sales/service process, offering multi-channel service, and integrating systems.

Other articles relate dynamics capabilities to IS assets and capabilities. Pavlou and El Sawy (2006; 2010) introduce and discuss the construct of IT leveraging competence, which they describe as the ability to effectively use IT functionalities. Bhatt and Grover (2005) distinguish

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[1] For details see http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=346

between value, competitive, and dynamic capabilities as three distinct types of capabilities. IT infrastructure is positioned as a value capability and IT business experience and relationship infrastructure are positioned as competitive capabilities. Bhatt and Grover see dynamic capabilities as broader, organizational capabilities related to 'the ability to search, explore, acquire, assimilate, and apply knowledge about resources, opportunities, and how resources can be configured to exploit opportunities.' Kim et al. (2011) differentiate IT capabilities (IT personnel expertise, IT infrastructure flexibility, and IT management capabilities) from process-oriented dynamic capabilities, and examine and test their relationships and their influence on financial performance. Sambamurthy et al. (2003) focus on agility, which is the ability to detect and seize market opportunities with speed and surprise. They argue that IT competence (IT investments and capabilities) influence firm performance through three organizational capabilities (agility, digital options, and entrepreneurial alertness) and strategic processes (capability building, entrepreneurial action, and coevolutionary adaptation).

4. The dynamics of the IS Function

Technology and market changes require the IS function not only to think about IT-enabled business innovation, but also to reconsider its own role within the organization and how it co-creates value with the business. This would mean that, similar to the organizations as a whole (Augier and Teece 2008), the IS function should identify emerging opportunities and seize upon them for business while simultaneously effectuating continues organizational renewal of itself. In this section, we will discuss in more detail what a dynamic perspective on the IS function could entail. In particular, we will address two main questions here, firstly, what is our understanding of the IS function based on dynamic capability theory and, secondly, what does a dynamic perspective upon the IS capabilities mean?

The starting-point for an applied dynamic capabilities theory for the IS function requires specifying what 'dynamics' and 'dynamic capabilities' are within the context of the IS function. Following Teece et al. (1997), we propose that the dynamics of the IS function refers to the capacity of IS function to renew the IS capabilities so as to achieve congruence with the changing business environment, in particular when timing and time-to-market are critical , technology changes rapidly, and the nature of future business needs and opportunities is hard to determine. As dynamic (higher-order) capabilities are different from operational (zero-level, ordinary) capabilities, a 'zero level,' which is locally defined, has to be determined (Winter 2003). Winter provides an example of R&D which for a manufacturing firm is a dynamic capability, but for an R&D firm an operational capability. For the IS function this 'zero level' may be defined by the primary and support activities required to derive and leverage business value through IS (Peppard and Ward 2004). This provides us with a different perspective on dynamics capabilities for the IS function then when we would reason from the organization as a whole. For example, while IS development may be a dynamic capability for the organization as a whole, it should be seen as an operational capability for the IS function. We go into more detail later, when we discuss specific IS capabilities.

A strategic approach based on dynamic capabilities can help the IS function to succeed in an open environment with rapid innovation, globally dispersed sources of invention, innovation and IT capability, following the reasoning on enterprise performance of Teece (2007). It stresses the entrepreneurial nature of the IS function by shaping (and not just adapting to) the environment and the role of intangible assets (especially knowledge and relationships). This strategic approach for a dynamic IS function may also benefit from a comparison with the dynamics of IT companies. For example, Harreld et al. (2007) use dynamic capabilities theory to describe the transformation of IBM 'from a technology company to a broad-based solutions provider to, perhaps, an exemplar of the new world of open systems and on-demand capabilities.'

Teece (2007) presents a dynamic capabilities framework that differentiates between dynamic capabilities for sensing, seizing and transforming. Sensing (and shaping) involves scanning,

creation, learning and interpretation supported by analytical systems (and individual capabilities) to sense, filter, shape and calibrate opportunities. Seizing involves investment in development and commercialisation and requires enterprise structures, procedures, designs and incentives. Transforming involves the recombination and reconfiguration of tangible and intangible assets and organizational structures as the enterprise grows and markets and technologies change. Teece's framework can be used as an underlying foundation for understanding the dynamics of the IS function. For example, Harreld et al. (2007) show the application of this framework to IBM's transformation. The application of Teece's framework to the IS function may be further supported by more IS-specific frameworks, for example, the Net-Enabled Business Innovation Cycle (NEBIC) of Wheeler (2002), which has considerable overlap with Teece's notions of sensing and seizing (Teece 2007). However, even though Wheeler pays attention to IT, it addresses the organization as a whole and, therefore, an adaptation to the context of the IS function is still required.

Understanding of the IS function based on dynamic capability theory sets the scene for our next question, what does a dynamics perspective upon the IS capabilities mean? As discussed earlier, different authors have identified and discussed different IS capabilities with some authors providing a comprehensive framework for the IS function (e.g., Feeny and Willcocks 1998a; Peppard and Ward 2004). We will discuss IS capabilities at the portfolio level and at the level of the individual capability.

One of the most prominent activities, from a dynamic perspective, is managing the bundle of IS capabilities as the core idea behind dynamic capabilities is the purposeful creation, extension or modification of the organizational resource base (Helfat et al. 2007). The role of the IS capabilities frameworks in this process is interesting both for theory development as well as practical guidance. From a theoretical perspective, the IS capabilities frameworks may impact the capability lifecycle and the heterogeneity of capabilities (Helfat and Peteraf 2003). The use of IS capabilities frameworks may be seen as part of the cognitive approach to organizational learning involving knowledge articulation and codification for the creation and evolution of operational (and dynamic) capabilities (Zollo and Winter 2002). Moreover, the bundle of IS capabilities should be managed with a focus on complementarities and cospecialisation (Augier and Teece 2008). The IS capabilities frameworks may be able to provide here further insights as some of them explicitly address the relationships between the IS capabilities (e.g., Feeny and Willcocks 1998a; Peppard and Ward 2004). From a practical perspective, management needs awareness and understanding of the portfolio of IS capabilities in terms of the current situation and the desired, future situation. In addition to a more generic analysis of the external opportunities and treats and the internal strengths and weakness of the IS function, the IS capabilities frameworks can provide guidance here by supporting the analysis and decision making. For example, an IS function that has had a supply focus so far may need to pay more attention to the demand side via developing a capability for Exploitation including Benefits Planning and Benefits Delivery (Peppard and Ward 2004).

A dynamic perspective requires a critical view on the IS capabilities frameworks. Firstly, understanding the portfolio of IS capabilities requires paying attention to both operational and dynamic capabilities. However, as the IS capabilities frameworks are based on RBV, they will predominately be focussed on operational capabilities, discussed in more detail below. Secondly, there are differences between the IS capabilities frameworks with respect to the defined IS capabilities and, while all based on RBV, the underlying reasoning is different and have their origin in different settings. For example, while Wade and Hulland (2004) include internal IS Development, Feeny and Willcocks (1998a) stress external sourcing via Informed Buying, Vendor development, Contract Facilitation and Contract Monitoring. While for practitioners there may be work-around by carefully evaluating and selecting the frameworks, this lack of uniformity and consistency will not be helpful for progressing our theory development related to the IS function and its performance. Thirdly, the IS capabilities frameworks will have a limited lifespan due to technology and market changes. So the frameworks and their underlying reasoning have to be evaluated critically when using them for theory development or applying them for practical guidance.

From the dynamics at the level of the portfolio of IS capabilities, we now move our attention to the dynamics at the level of the individual IS capabilities. Eisenhardt and Martin (2000) note that dynamic capabilities consist of identifiable and specific routines that often have been the subject of empirical research in their own right, for example, product development, strategic decision making , and alliancing. So could one or more of the IS capabilities, while based on RBV, represent a dynamic capability? For example, for the organization strategizing is generally considered a dynamic capability, therefore, it may be argued that IS strategizing is a dynamic capability for the IS function.

Moreover, even the more operational IS capabilities may have dynamic aspects as there is a blurring line between operational and dynamic capabilities (Helfat and Winter 2011). Some IS capabilities may be used for both operational and dynamic purposes. For example, for IS outsourcing the initial decision to outsource will have a large impact on the operational activities, but once activities and systems are outsourced, it becomes more business as usual. This may change again when the way IS is outsourced changes, for example, from selective to total outsourcing. Moreover, there will almost always be a development of a capability over time (Helfat & Peteraf, SMJ, 2003). For example, while IS Development (e.g., Wade and Hulland 2004) may be positioned as an operational capability for the IS function, improving the maturity level or innovating the development methodologies (e.g. from waterfall to agile), may be seen as dynamic. Or there may specific ways in which IS Development is organized that makes it dynamic, for example, Clark et al. (1997) discuss change-readiness as the ability to deliver strategic IT applications within short development cycle times by utilizing a highly skilled internal IS workforce.

5. Concluding remarks

In this paper we focussed on the IS function itself. We proposed that a dynamic perspective on the IS function and capabilities is required to continuously derive and leverage business value through IS/IT in a changing and unpredictable business and technology environment. So far this dynamic perspective on the IS function and capabilities has been neglected in the main IS literature where the focus has been on the resource based view. We set out to apply dynamic capabilities theory to the IS function and capabilities.

We presented a first conceptualisation of the dynamic IS function specifically focussing on the dynamics of the IS function itself instead of the wider organization. This requires paying more attention to dynamic capabilities in the IS strategy. We also suggested to further develop the conceptualisation of the dynamic IS function with a more entrepreneurial focus by means of the sensing, seizing and transforming framework. We stressed the potential of the IS function learning from the transformations of IT companies. Moreover, we discussed the dynamic IS function as way of thinking about the purposeful creation, extension or modification of the bundle of IS capabilities. Specifically we addressed that IS capabilities frameworks, on the one hand, can contribute to a dynamic IS function as part of the learning mechanisms for the creation and evolution of capabilities and that some of the IS capabilities may present dynamics capabilities or have dynamic aspects. On the other hand, we also argued that IS capabilities frameworks need to be revised building on an extended theoretical foundation that includes dynamic capabilities theory and that frameworks with operational IS capabilities will always have a limited lifespan due to technology and market changes. These initial insights demonstrate the contribution of a dynamic perspective on the IS function itself.

This paper only presents the first ideas of an applied dynamic capabilities theory for the IS function and capabilities. Further conceptual and theoretical development is needed to advance the understanding and derive hypothesis. Moreover, explorative empirical research can help to provide a richer understanding of the IS function and capabilities from a dynamic perspective and to better contextualise and extend the dynamic capabilities theory for the IS function.

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