Combining Capabilities: A Resource Based Model of ICT Advantage

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ABSTRACT

Information and communication technologies (ICTs) increasingly are being linked to organisational value. However, current research tends to examine these resources in an uncoupled way despite numerous calls for work which examines ICTs in a more complex way. This research addresses this gap, by investigating how ICTs are successfully combined with other resources in the context of an exemplar organisation. An integrated model of advantage is presented based on two distinct groupings of capabilities. In essence, this research demonstrates how the total ownership of ICTs, within the case studied, presents a potential advantage. The advantage is realised through the combination of capabilities and the inclusive approach to ICT development employed in the case organisation.

Keywords: Technology, Innovation, e-Business

INTRODUCTION

Organisations have faced many changes in their business practices due to the emergence and widespread use of information and communication technologies (ICTs) over the last two decades. In this time period, organisations have invested large amounts of time and money into the adoption of ICTs. With such large investment comes a responsibility to understand these investments, yet, many questions remain unanswered. One could question: What are the main sources of ICT advantage? How are ICTs combined with other organisational resources? While prior research has tended to focus on individual resources and capabilities (such as capital requirement or proprietary technology (Mata et al., 1995)), there is an emerging stream of research which recognises that ICTs have limited value when used in isolation. As such, value is significantly enhanced when resources are combined with other organisational resources and capabilities (Mata et al., 1995; Powell & Dent-Micallef, 1997; Ray et al., 2004).

Acknowledging the systemic approach required to study ICTs, scholars of information systems have recognised the need for better ways to examine them (Mooney et al., 1995; Ray et al., 2004). Moreover, there have been calls for further review and testing of ICTs utilising frameworks from other literatures, like the resource based view (RBV) from the strategic management literature (Bharadwaj, 2000; Powell & Dent-Micallef, 1997). The RBV is an appropriate framework to guide this research due to its focus on resources and capabilities. The RBV argues that a firm’s source of
competitive advantage lies with the resources and capabilities it owns and controls and the unique way in which a firm bundles them together (Barney, 1991; Penrose, 1959; Wernerfelt, 1984). This paper examines ICTs in their environment to address this call. The rest of this paper briefly outlines past research, the research design employed in this research, and presents and discusses integrated capabilities. Finally, a summary is provided along with implications for future research.

**PAST RESEARCH**

Current literature shows that there is growing support for the positive relationship between ICTs and advantage (Lin & Lin, 2006; Melville *et al.*, 2004; Menon *et al.*, 2000; Porter & Millar, 1998). Researchers have attempted to identify sources of advantage and, more importantly, sources of ICT based advantage (Mata *et al.*, 1995; Ray *et al.*, 2004). Limitations are introduced in much of the current research due to the simplistic way in which organisational resources such as ICTs are examined. Advances in RBV research provide a new lens for examining the combination of resources and capabilities\(^1\). For example, Hult and Ketchen (2001) posit that it is the combination of resources that collectively contribute to competitive advantage. The researchers suggest market orientation, entrepreneurship, innovation and organisational learning collectively contribute to the creation of unique resources. Similarly, Jones and George (1998) have examined cooperation, teamwork, and trust by viewing these resources or capabilities in a coupled way. Newer streams of research linked to the RBV such as the dynamic capabilities approach and the knowledge based view also provide insights into new places to look for valuable resource and capability combinations. More specifically, dynamic capabilities research suggest that value is gained when resources are utilised in coupled and innovative ways (Eisenhardt & Martin, 2000; Miller, 2003; Teece *et al.*, 1997). The knowledge based view also adds to this suggesting that knowledge resources are a critical part of interconnected resources or capabilities (Liebeskind, 1996; Spender, 1996a, 1996b; Wright *et al.*, 2001).

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\(^1\) There has been much discussion of the terms resources and capabilities see Barney (1991) and Peteraf (1993) for discussion.
Another significant gap in current research examining ICT resources relates to the methodologies employed. There are numerous calls to employ more qualitative research methods (Chan, 2000; Powell & Dent-Micallef, 1997; Rouse & Daellenbach, 1999). More specifically, what is needed is the use of in-depth fieldwork in organisations such as a case study approach. In her review of the field Chan (2000) also recognised that the field may not be fully understood without more qualitative contributions to the conversation.

In short, researchers currently have some understanding of how single resources may lead to advantage. However many resources and capabilities do not function in isolation. Several researches acknowledge there is a need to understand how more complex systemic resources such as ICTs might lead to an advantage. This research therefore aims to examine ICT resources in a complex way employing a qualitative research method. Specifically this research aims to utilise the RBV to address the following research questions: What are the sources of ICT advantage? How are ICT resources combined with other resources and to create valuable resources and capabilities?

RESEARCH DESIGN

The research was conducted employing a single case study design utilising interviews, observation and documents. The research case was chosen for its unique situation in reference to performance and ICTs, in particular for the consistent records of above average performance and the unique way in which ICTs are developed and used in the organisation. (The organisation is hereafter known as ABC.) The service based nature of ABC’s business also meant that they are reliant on ICTs. ABC is a major player in their industry employing approximately 4,000 employees. The data collection took place over an eight month period which allowed an examination of the activities and decisions relating to a three phased customer relationship management development project. Fifteen interviews were undertaken with interviewees with a detailed knowledge of the development, implementation, and use of ICTs. Interviewees included senior managers, project managers, project team members, and end users of the CRM system. Interviewees were asked to tell their own story about their role in ICT projects. A review of the relevant literature was also used as a guide in developing further prompting questions. For example, sources of advantage posed or identified from
other studies were used as discussion points in the interview process (e.g., Yeoh and Roth’s (1999) resource based study of critically important resources). Observation sites included natural working environments, training sessions, user groups and steering group meetings. Public and private documents were reviewed including ABC’s annual reports, meeting minutes, scoping reports, and communication videos.

The data analysis technique used in this research was an adaption of grounded theory (Strauss & Corbin, 1998). More specifically, the grounded theory process involved three coding stages: open coding, axial coding and selective coding. Theoretical sampling was continued until the analysis of the data (undertaken in parallel to the data collection) provided nothing new to the theoretical scheme being developed.

**INTEGRATED CAPABILITIES AT ABC**

The analysis of the data resulted in a number of resources (615) being linked to value at ABC. The resources were then further examined leading to 87 unique resources related to three main themes: ICT, human, and strategic resources. Under closer examination, it became clear to the researchers that the resources at ABC did not exist in isolation but in a myriad of complex interrelationships. In particular two distinct types of resources were identified. The first were resources which had an effect on ABC’s information systems development at a particular point in time (i.e., a point in time in the life of a product or service) and the second were those which affected the whole life of the information system (i.e., at each stage in the life of a product or service). In line with these distinct types of resources the researchers grouped resources into two constructs which together form an *integrated model of advantage* at ABC. The first construct is termed *lifecycle capabilities* and the second *embedded foundational capabilities*.

*Lifecycle capabilities* represent key actions which contribute to successful information system processes at ABC. The construct is made up of six key capabilities which form a continuous cycle of development of information systems (shown in Figure 1). Details of the resources which

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2 That is, resources identified as sources of value at ABC.
contributed to each of the six capabilities can be seen in a paper on the larger study (Rastrick, 2008). The combined effect of the integration of these capabilities outlines a clear way information systems are developed at ABC. That is, *lifecycle capabilities* are valuable, strategic, technological, and organisational capabilities fundamental to the successful development of information systems. The capabilities are built over time from experiences, knowledge, and skills embedded at ABC. The capabilities evolve as learning from each project is fed back into the lifecycle. For instance, learning from experiences regarding ways of working and interacting change capabilities over time. A specific example of such learning can be seen in the way the implementation of information systems has changed over time at ABC. Therefore, capabilities are built on learning from historical projects\(^3\). As participants in a development process undertake a project they learn at each stage, individually, as well as at group and organisational levels. This learning in turn, feeds back and changes the process (and therefore capabilities evolve based on such learning).

**Figure 1: Lifecycle capabilities at ABC**

While the capabilities which form the lifecycle are presented as a series of independent stages undertaken in a cyclic manner, it must be noted that the lifecycle is not rigid, nor are the stages independent of each other. Each of the stages are very interconnected. Multiple projects may be undertaken at the same time and each of the stages can occur in a much more fluid manner.

The second construct, *embedded foundational capabilities*, is a group of key organisational capabilities which are seen to contribute to the success of ABC across time (seen in Figure 2). That is, these capabilities do not have an effect at a point in time like *lifecycle capabilities*. Rather, *embedded foundational capabilities* have an effect across the conception, development and implementation of information systems. The name of this group of capabilities reflects the deeply embedded nature of these organisational capabilities. That is, each of the capabilities are fundamentally linked to other capabilities such as those outlined in the lifecycle construct. While *lifecycle capabilities* combine technical and other organisational capabilities, *embedded foundational capabilities* combine technical and other organisational capabilities.

\(^3\) It is clear ABC’s capabilities change and evolve. However, the way in which this happens is beyond the scope of this research. What is significant to this research is that there is collaboration and knowledge sharing which influence how capabilities are interrelated.
capabilities are all organisational capabilities. More specifically, each of the embedded foundational capabilities relates to the organisational specific ways of working and the relationships between different stakeholders at ABC.

**Figure 2: Embedded foundational capabilities at ABC**

Lifecycle and embedded foundational capabilities together form an integrated model of advantage at ABC (see Figure 3). The model shows how interlinked capabilities are used in the conceptualisation, development, and use of information systems at ABC. There are strong linkages between the embedded foundational capabilities and each of the lifecycle capabilities. The linkages are indicated in the figure (at a high level) via the dotted lines from each of the embedded foundational capabilities circling the lifecycle capabilities. This emphasises the supportive role each of the embedded foundational capabilities plays in the development of information systems at ABC.

**Figure 3: Integrated model of advantage at ABC**

While at one point in time the model is constrained by the firm’s antecedent capability base, it also creates new resources (and therefore, alters capabilities) over time through a process of path dependant learning\(^4\). That is, as each new project is undertaken and moves though the lifecycle, path dependant learning occurs which is used to alter capabilities in search of continuous improvement. While the way in which capabilities evolve is beyond the scope of this research, it is clear that learning and knowledge about each of the capabilities is valuable to ABC. Therefore, a critical part of this model is the institutional knowledge captured in each stage of the lifecycle. This research recognises such knowledge, as seen by the two occurrences of aspects of knowledge in the integrated model of advantage. Further details of such linkages can be found in the larger paper (Rastrick, 2008).

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\(^4\) The way in which capabilities evolve is hinted at but, as previously mentioned, is beyond the scope of this research. Examination of the evolution of the integrated model over multiple projects would be a fruitful area for further research.
DISCUSSION

ABC’s total ownership of technology is a critical factor underpinning the *integrated model of advantage*. That is, ABC’s decision to retain ownership and knowledge of their ICTs means they have a pool of collective knowledge which has potential to enable a position of advantage. This means ABC retains strategy and architectural knowledge of their ICTs at a macro level, and procedural and institutional knowledge about specific ICTs and how they combine with other ICTs is retained within the organisation. Additionally, knowledge of the development of methodologies, ways of working, and project specific knowledge⁵ are also captured. Knowledge is thus captured in multiple ways. For example, ABC have technical knowledge banks of procedural practices and capability indexes outlining skills and capabilities of employees. The collaborative approach to ICT development is another way in which ABC captures organisational knowledge. The macro and micro knowledge outlined gives ABC a large potential advantage over other organisations that develop ICTs in different ways (which do not allow them to retain this knowledge).

However retaining knowledge only gives ABC advantage potential. To realise this potential, ABC combines organisational capabilities. Combinations of capabilities are achieved by utilising multiple capabilities at the same time and using an inclusive approach to the development of ICTs. Extensive use of teams in the development of ICTs aids in cultivating an inclusive approach. As such, many formal and informal channels of communication exist which protect and enhance relationships and knowledge sharing within teams⁶. These channels allow knowledge which is largely tacit in nature to transfer from the individual to group levels and allow the company to grow the above-mentioned level of procedural and institutional knowledge. Physical work structures also reflect the inclusive approach used at ABC in that they promote formal and informal interactions. Transfer of knowledge through these multiple channels, and experience in developing ICTs help reinforce the knowledge base.

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⁵ Such as knowledge of key directions and decisions of specific ICT projects.

⁶ As reflected in the *embedded foundational capabilities* in the *integrated model of advantage*. 
Three significant benefits of this inclusive approach are evident: better ICT solutions, a commitment to change from employees of the organisation, and organisational synergies realised. For example, there are strong levels of satisfaction evident at ABC regarding their recent major upgrade to their CRM solution. Such satisfaction is largely a function of the way the solution meets the organisation’s needs. The inclusive approach to the development ensured stakeholder’s needs were met.

The commitment to change is built from awareness and understanding of where a project is at, what the progress is going forward and what the different stakeholder’s roles are. Supportive capabilities such as those evident in the embedded foundational capabilities at ABC help foster such awareness and understanding. Increasing levels of group and institutional knowledge by the transfer of knowledge between teams enables awareness and understanding. For instance, if one stakeholder holds project and process knowledge then change can occur. However if groups of stakeholders hold project and process knowledge then more harmonious change can occur because many are taken on the journey of change. Therefore, increasing levels of group and institutional knowledge increase levels of trust, engagement, and most significantly, cultivate commitment to change. Furthermore, the ongoing nature of change at ABC helps further strengthen relationships, knowledge sharing and the resultant knowledge base.

Synergy gained from interlinked capabilities and the inclusive approach means that the linkages between capabilities are as important, if not more important, than each of the capabilities being present in an organisation in a non-integrated way. This is because the capabilities are coupled in such a way that the sum of all the capabilities has greater organisational value than the sum of individual capabilities. In other words, if the inter-linkages did not exist many of the benefits of the model would not be realised. For instance, if ABC did not form development teams, interact, communicate and share knowledge in the ways they do, then their procedural and institutional knowledge base would be limited and would certainly not grow in the way that it does. While a development methodology could still be followed without the closeness and interactions of capabilities, the level of strategic alignment, awareness, commitment and engagement from
stakeholders would not be as strong. Moreover, the synergy implicit in the integration of capabilities means that if another organisation could imitate multiple capabilities they are not likely to see the level of advantage evident at ABC.

In summary, retaining collective strategic and operational knowledge gives ABC a potential advantage. To realise this potential ABC employ an inclusive approach to ICT development. The inclusive approach means multiple procedural and enabling capabilities are utilised at the same time. The effect of this is better ICT solutions and a commitment by stakeholders who become part of a project. Organisational synergies are also realised. The end result is better performance for ABC.

Many individual elements of the integrated model of advantage are evident in the literature. For instance, strategic alignment (Teo & Ranganathan, 2003), internal commitment (Montealegre, 2002), teamwork (Ray et al., 2005), and knowledge (Wiklund & Shepherd, 2003) are all individually seen as valuable in current research. Moreover, some models of interlinked capabilities are seen in other research. For instance, the integrated model of advantage compares to research which examines: dynamic capabilities (Teece et al., 1997), research and development routines (Pan et al., 2006), systems development methodologies (Larman & Basili, 2003), as well as different capability constructs (e.g., Savory, 2006; Tyler, 2001; Yeoh & Roth, 1999). Each of these bodies of research outlines integration of capabilities in search of change. Evidence of links to strategy and knowledge are also evident in much of the aforementioned research and the integrated model of advantage. This research provides empirical support for current research and suggests that organisational advantages are built on interlinked capabilities which are embedded within an organisation, and which exhibit elements of continuous improvement. The integrated model of advantage extends current research by outlining two constructs or different groupings of resources and capabilities which are made up of specific interlinked organisational capabilities. Differences are also introduced due to the level of detail provided in the integrated model of advantage (further outlined in the larger paper) not evident in other research.
SUMMARY AND IMPLICATIONS FOR FUTURE RESEARCH

Given the ongoing interest and spending on ICTs in organisations there is little doubt that understanding these entities in more detail is valuable. Prior research in the area has examined potential advantages derived from ICTs in a fairly simple and uncoupled way. The research addressed the first research question *What are the sources of ICT advantage?* by outlining three broad classifications of valuable resources which were seen as valuable to ABC: ICT, strategic, and human resources. While these resources were individually valuable, the total value of the resources working together was seen to be more valuable than the sum of the parts. As such the second research question, *How are ICT’s combined with other resources to create valuable resources and capabilities?* resulted in an *integrated model of advantage* at ABC. The model outlined how two distinct types of capabilities are valuable to ABC: lifecycle and embedded foundational capabilities. The essence of the *integrated model of advantage* suggests that the success of ABC can be attributed to the complex and interlinked nature of capabilities and the inclusive approach utilised in the development of ICT’s, as well as the embedded knowledge underlying each capability and the model in its entirety. Claims have been made in the literature about interconnection of resources and capabilities (conceptually) and some research is now starting to show linkages among resources or capabilities (at a basic level). However, research which provides distinctions between types of interconnected resources and capabilities is considered to be at an infant stage. Therefore, this research provides an early in-depth case study which identifies integrated capabilities and helps to explain why bundling them together can be beneficial to an organisation.

This research has important implications for researchers in the field of information systems and strategic management. The research makes a contribution to information systems research by providing one of the first grounded models of integrated or interlinked ICT and other organisational capabilities. The results suggest that the total ownership of technology evident at ABC offers a potential advantage which can be realised through the integration of capabilities and an inclusive approach to ICT development. A contribution is also made to the strategic management area, which is concerned with identifying specific sources of advantage. This research empirically
demonstrates that there is a strong connection between resources and capabilities (and capabilities and capabilities) in a high performing organisation. Furthermore, this research adds strength to the claims that organisational advantages are largely dependent on organisational knowledge.

The findings are based on an in-depth case study of ABC. The company was chosen due to the unique position of advantage they have in the marketplace. The research discussed the company’s idiosyncratic characteristics which have impacted on their current position in the marketplace. Therefore it is likely that the findings are not generalisable to all companies in all marketplaces.

In the same way that Montealegre (2002) made comment that resources and capabilities associated with his model of ‘capability development’ are not exhaustive, the results of this research are not intended to be an exclusive list of all aspects of ABC’s advantage. Furthermore, this research made no attempt to examine in depth the link between capabilities and competitive advantage. Further research could take the capabilities identified in the integrated model of advantage and examine this.

Given the clear lack of empirical research in the area of combining capabilities, the potential for future research in this area is substantial. Building on research by Tyler (2001), which calls for more work which examines the relationships between key organisational resources and capabilities, it is hoped that this research will encourage more research which does this.

Finally, a significant part of ABC’s advantage was found to be associated with the embedded organisational knowledge captured. Future research could examine other organisations that undertake development projects using alternative methodologies and ways of working. Such research should consider how or if the organisation (undertaking developments with significant difference) captures such knowledge. For example, further research could examine how organisational knowledge is captured if other development styles, such as employing extensive use of outside consultants, are utilised.
REFERENCES


Figure 1: *Lifecycle capabilities at ABC*

**Figure 2: Embedded foundational capabilities at ABC**

**Figure 3: Integrated model of advantage at ABC**