THE INFLUENCE OF INFORMATION TECHNOLOGY ON RESOURCES WHICH YIELD SUSTAINED COMPETITIVE ADVANTAGE

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ABSTRACT

The debate among strategic management researchers regarding the capability of information technology to facilitate sustained competitive advantage has culminated with the consensus that IT itself is not a potential source of sustained competitive advantage, because IT are readily replicated. This paper develops a model which proposes that in situations where a firm has extracted a competitive advantage from a resource, IT can be used both to augment the benefits or the sustainability of the benefits generated by the resource. Implications for practitioners are discussed along with directions for future research.

Keywords: Sustained Competitive Advantage, Complimentary Resources, Information Technology, Resource Based View

INTRODUCTION

Strategic management researchers have long sought to understand why some firms consistently outperform others. This phenomenon, which has come to be called Sustained Competitive Advantage (SCA) has been a central area of inquiry in Strategic Management research. The Resource Based View (RBV) (Barney, 1991) argues that firms differ in their access to resources, and it is this access to resources which explain why some firms consistently outperform others. The RBV provided a framework for researchers to identify and categorize resources that may facilitate SCA. Information systems researchers have identified a variety of organizational benefits facilitated by Information Technology (IT) and have contended that these benefits could facilitate sustained competitive advantage, however empirical results do not support direct relationships between IT and sustained competitive advantage. (Piccoli & Ives, 2005). However literature also illustrates numerous examples of IT facilitating innovation, improvements in efficiency, and several other factors that have been shown to be indicators of performance.

This apparent paradox suggests that researchers have yet to foment an accurate understanding of the relationship between IT and firm performance in the dynamic competitive environment in which modern firms compete. The objective of this paper is to enhance that understanding by outlining some mechanisms by which IT can facilitate sustained competitive advantage.

Following Ferina et al. (2021, p. 3), information technology is defined as "a computer-based information system consisting of hardware, software, internet, and other telecommunication networks, as well as using database resource management techniques and various other computer-based technologies to convert data into various kinds of information." Consistent with strategic management conceptualizations of IT, this paper views IT as a resource, which firms can invest in to develop assets and capabilities which can deployed in the future to generate returns.

Following Barney (1995), we define competitive advantage as the condition occurs when a firm achieves stronger returns than those of the other competitors in their industry. Product life cycles vary along the time dimension, so a quantitative definition of sustainable is not meaningful.

The preponderance of the current body of research investigating the role of IT in the development and sustainability of competitive advantage conclude that IT is a support function opposed to a strategically valuable differentiation mechanism. While numerous micro-level studies demonstrate measurable and impactful benefits of IT, at the macro-level and over time, empirical results do not support consistent elevated performance outcomes (e.g. Bhatt & Grover, 2005). Researchers have pointed to the relative ease by which IT can be replicated to explain why advantages conveyed by IT are not sustainable (Bilgihan et al., 2011), and have outlined a number IT characteristics which represent of barriers to the erosion of competitive advantage (Piccoli, 2008), indicating that advantages gleaned from IT can be substantial, but will eventually erode as the IT or the benefit conveyed by the IT is replicated.

This paper proposes that IT can serve as a moderator, augmenting the effect of extant resources that provide benefits which yield sustained competitive advantage, increasing the sustainability of existing advantages and although not capable of producing above average returns on their, still play an important role in the competitive positions of firms. It is further proposed that firms who concentrate their IT efforts on enhancing the benefits realized from information dependent resources that currently represent a source of sustained competitive advantage will experience

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greater rents and/or improved sustainability of those rents.

This paper further proposes that IT resource allocations decisions, which are traditionally prioritized based on alignment with organizational objectives (Dissanayake et al., 2015), should be prioritized based on their ability to support advantage sustaining activities.

This paper proceeds as follows: In the following section, relevant literature is reviewed. This literature is synthesized into a framework of competitive advantage sustainability in which IT resources can be deployed to augment existing competitive advantages and enhance the sustainability of other competitive advantages. Implications for the SCA paradigm as well as managers that are considering IT resource allocation decisions are outlined, and directions for future research are identified.

LITERATURE REVIEW

IT and Sustained Competitive Advantage

SCA is a primary paradigm within the strategic management domain. While extensive early work on competitive advantage was straightforward (Brandenburger & Stuart, 1996), however the paradigm became more complex when researchers started to try to understand the factors that drive sustainability of competitive advantage (Wade & Hulland, 2004).

Competitive advantage refers to a condition which exists when one competitor in an industry to is able to outperform the others in at least one area. Researchers have investigated a wide variety of drivers of competitive advantage, many of the drivers are idiosyncratic and stem from windfalls. As a result, the advantages generally do not persist, and it is difficult for researchers to offer actionable advice to top management teams in pursuit of competitive advantage.

Barney (1991) is widely credited with articulating a theory of SCA, which contends that firms in an industry differ in their access to resources, and it is the access to recourses which facilitates competitive advantage. According to Barney, resources that are rare, valuable and heterogeneously distributed across firms in an industry have the potential to facilitate competitive advantage. For an advantage to be sustainable, Barney suggests that these resources should also be difficult to imitate or substitute.

Barney's SCA framework served as the foundation for over a decade of intense research attention on the topic. While a large number of studies evaluated specific drivers of competitive advantage (e.g. Mata et al., 1995), a smaller number of studies explored the sustainability question further by examining the mechanisms of imitability and substitutability (Piccoli & Ives, 2005). At the same time, the Knowledge Based View (KBV) was emerging along with an industry trend toward knowledge management. The KBV, which is the most promising application of IT to the RBV to will be discussed later.

Competitive advantage occurs one competitor in an industry is able perform better in an area than the other competitors. When a firm is able to perform better because of a resource, it stands to reason that if other firms were able to access that resource, they may be able to perform as well as the leader, and thus eliminate the competitive advantage. Coyne (1986) refers to this as erosion of competitive advantage. Erosion is driven by a variety of factors, including how visible the relationship between the resource and the advantage is, access to the resource and the adaptive capabilities of the laggard firms (Piccoli & Ives, 2005).

When an IT facilitates a competitive advantage, perhaps a marketing advantage of an efficiency (Keith et al., 2011), it can be quite easy for competitors to develop a similar system which conveys the same benefits, thus eroding the advantage. This may explain the lack of empirical support for a relationship between IT initiative sand SCA, despite findings of a competitive advantage. Mata et al. (1995) evaluated 4 attributes of IT using the RBV framework, and found that only one contribution, IT management skills, were a source of SCA. Porter and Miller (1985) contend that the main function of IT is to manage the value chain, not to outperform other organizations. Following this logic, IT driven competitive advantages will eventually erode, and sustainability becomes a continuum rather than a persistent state. System developers can strategically develop IT to be difficult to imitate, less visible and thereby extend the amount of time that the initiative will yield a competitive advantage.

Piccoli and Ives (2005) identify a theory of barriers to erosion, in which systems vary by response lag drivers. Response lag drivers include the complexity of the project, the uniqueness of the system, visibility, and the degree of business change associated with the initiative (Piccoli & Pigni, 2022). Basically, more complex and wider reaching projects are more difficult to imitate. In addition, Piccoli and Pigni (2022) note that first movers can increase barriers to erosion by learning about the capabilities of the system and adapting their business processes while competitors are still trying to understand the system, collecting data while the system runs and by establishing exclusivity agreements with other entities in the supply chain (as Apple did in 2007 in the USA, only selling iPhones through AT&T).

According to Miller and Shamsie (1996), knowledge-based resources generate value from the expertise embedded in the organization's employees. Causal ambiguity (the difficulty that a competitor experiences in understanding where the value is derived from) makes copying the value derived from knowledge-based resources more difficult. Using Barney's (1991) RBV framework, Grant (1996) argued that knowledge, which was not traditionally viewed as a resource, could be a source of SCA. The expertise of employees is rare, valuable, heterogeneously distributed across firms, and, it is also difficulty to imitate and substitute. However, knowledge differs from other resources, because it is more difficult to manage. Knowledgeable employees can leave the firm at any time, taking the valuable resource with them (Furner et al., 2009).

Knowledge management professionals endeavored to develop information systems that could capture the knowledge contained in the minds of employees, store and organize this knowledge and make it accessible to future employees, thus making knowledge more like a traditional resource. Oil can be extracted from the ground, stored in tanks, and processed into value producing products when the firm is ready to do so. Knowledge Management Systems KMS sought to capture valuable knowledge from the minds of experts, store and organize that information in databases and make it accessible to new employees when the time is right. Despite the development of very sophisticated KMS and expert systems, KMS were only marginally effective, as they faced a number of challenges. First, knowledge capture from experts is plagued by a number of challenges. Not all knowledge is articulatable, and experts may not be able to explain their rationale to a programmer. Second, experts may not be willing to fully share the knowledge that they have accumulated, since their knowledge makes them valuable members of the organization and may even represent organizational power, they may wish to avoid giving their knowledge away. On the other end, application of existing knowledge in KMS is subject to challenges as well. KMS tended to have very large databases stuffed with a lot of information. Information overload is a condition in which the amount of information available to decision maker exceeds their capacity to process that information, leading them to ignore some of the information (Furner & Zinko, 2017). In a KMS context, a new employee faced with a large KMS database may choose to approach a problem themselves without the aide of the KMS if the time and effort necessary to learn from the KMS exceeds their willingness to prepare.

Recognizing the challenges associated with traditional KMS and that knowledge cannot be managed like other resources, contemporary KMS operate more like social media (Cao et al., 2015), connecting experts with those who are preparing to engage in an activity which could benefit from a knowledge infusion. Rather than sitting experts down with programmers who seek to codify their expertise, experts are connected with the new employees directly, and are more likely to be willing to share, more likely to articulate the factors that influence their decisions and the new employee is less likely to be overwhelmed by information overload.

MODEL AND PROPOSITIONS

While the preponderance of empirical studies conclude that IT alone will not yield SCA because it is easily imitated, IT can be used to augment the benefits conveyed by other resources and initiatives, thus influencing the competitive position of the firm. Under the RBV, characteristics of resources convey competitive advantages, and other characteristics of resources enhance the sustainability of those resources. This paper proposes a model which views IT as moderator between a resource and the advantage as it conveys, and between the resource and the sustainability of the advantage.

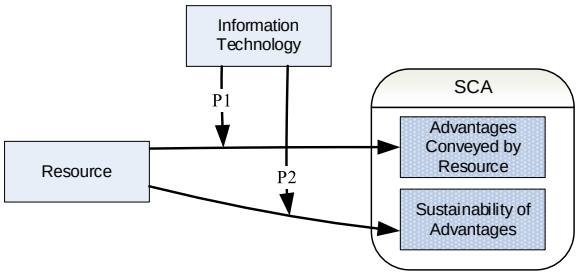

Figure 1: Proposed Model

Proposition 1

Previous studies have demonstrated a direct relationship between IT and competitive advantage (e.g. Brynjolfsson & Hitt, 1996), however findings related to SCA are not as positive, since IT is generally easy to copy or imitate. While the direct effects of IT on firm performance are well established by researchers, the interactive, moderating effects are less thoroughly understood. This paper proposes that IT can enhance the performance outcomes attributable to other resources. Employee expertise is used as an example, however other resources, such as consumer trust (which can be enhanced through investments in security) (Furner & Zinko, 2018), and brand image (Tran et al., 2022) can also be enhanced by investments in IT focused strategic initiatives.

Proposition 2

Information systems development cycles are getting shorter and shorter, and as a result, systems are more often being developed with a short-term transformational timeline and short to mid-term objectives (Furner, 2013). Still, IT can enhance the sustainability of competitive advantages in several

ways. First, IT are capable of obfuscation of value generating business processes (Nacer et al., 2016). By obfuscating business processes, firms can make the mechanics of their value formula less visible, thus reducing visibility and enhancing a barrier to SCA erosion. IT investments can also enhance consumer attitudes. For example, Tran et al. (2021) found that when consumers already have positive attitudes regarding a brand, mobile app usage can enhance brand attachment, causing the consumers to identify with the brand and encourage future sales.
A variety of other examples are likely available, but when used strategically, IT have the potential to enhance the sustainability of advantages conveyed by other resources

IMPLICATIONS

The traditional view of IT resource allocations assumes that IT initiatives are considered in terms of the organization's strategic position in its industry along with guidelines that are developed during the strategic planning process (Piccoli & Pigni, 2022). In this process, categories of risk and benefits are developed and steering committees evaluate expenditure proposals based on how they fit into these portfolios of risk and benefits. This requires project sponsors to develop project proposals and classify them into risk and benefit categories.

Our proposed model suggests that direct classification into these categories may not capture the full effect of IT dependent strategic initiatives on organizational outcomes, particularly when the IT dependent strategic initiative supports a competitive advantage facilitating resource.

Indeed, our model implies that mangers should reconceptualize IT in their strategic plans. While they rightfully understand that the direct long term impacts of IT are limited by their competitors access to IT, mangers could benefit from a view of IT as a facilitator of other advantages when used in conjunction with other resources.

Our model also carries implications for researchers. The SCA paradigm and Barney's (1991) model is so easy to apply that it generated hundred of studies of various resources, with only minimal theoretical advancement. Within the IT domain, the primary theoretical developments are the KVB and the Piccoli and Ives (2005) barriers to erosion framework. This study opens a new door, by suggesting that IT can be viewed as moderator for other relationships, rather than a direct driver of SCA.

CONCLUSION

Price (1982) brings up an interesting and noteworthy point: Much like accountants and attorneys, with the exception of firms whose product is IT, it is very rare to find IT managers on the top management team that is responsible for long term planning. A few notable exceptions are Max Hopper at Bank of America, DuWayne Peterson at Security Pacific National Bank, and John White at Texas Instruments. Practitioners have not yet begun to consider IT as a critical component of strategic planning. This may indicate that the extent to which IT could be used as a source of SCA has not yet been fully resolved. While decades of research have yielded a few interesting findings that ebb and flow with technology cycles, and are thus meaningful for only short periods of time, theoretical development has not advanced far past the RBV. The KBV and the Piccoli and Ives (2005) framework are notable exceptions, however the IT/SCA relationship is still poorly understood, and room exists for additional exploration of this relationship.

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