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# Information Technology Resources, Capabilities and IT-Enabled Competencies

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## Abstract

*There is a growing debate whether Information Technology can be a source of sustained competitive advantage. This paper investigates this issue by examining IT's role in producing competitive advantage through firm resources, capabilities, and competencies. The paper synthesizes the IT and strategy literatures and presents a resource-based view of how IT could be a source of sustained competitive advantage.*

## Introduction

Information Technology (IT) has long been regarded as a source of competitive advantage for firms. However, there is a growing debate whether IT is a source of sustained competitive advantage (Clemons, 1986; Vitale, 1986; Adcock, et al., 1993; Feeny and Ives, 1990). Many organizations have found that heavy investments in IT does not necessarily result in increased market share. Although IT applications are a critical and growing part of many firms, few systems can provide a sustainable competitive edge. Most systems can be imitated or improved by competitors, and any initial strategic advantage may be competed away (Neumann, 1994). In fact, with rapid technological change and declining IT costs, early adopters of new technologies and applications may sometimes find themselves at a competitive disadvantage (Vitale, 1986).

Thus, questions that remain unanswered are: 1) *Can IT be a source of sustainable competitive advantage?* and 2) *if so, how do firms sustain competitive advantages from their IT resources and capabilities?* Research that address these questions are relatively underdeveloped, both empirically and theoretically (Jarvenpaa & Ives, 1990). This study draws from resource-based view of the firm to define and interrelate three concepts - resources, capabilities and competencies in the context of information systems. A basic premise of the paper is that sustained competitive advantage arises from distinctive IT-enabled firm competencies and not just from IT resources and capabilities.

The rest of the paper is organized as follows: first, we review the resource-based view of the firm and discuss the distinctions between resources, capabilities and competencies; next, we present a framework that relates these three concepts and finally, we discuss this framework in the context of information systems.

## Resource-Based View

The resource-based view prescribes that firm resources are the main drivers of firm performance (Wernerfelt, 1984; Dierickx & Cool, 1988; Barney, 1991; Grant, 1991; Hall, 1991, 1992). Firm resources include assets, capabilities, organizational processes, firm attributes and information and knowledge controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness. Barney (1991) categorizes firm resources into three groups: 1) physical capital resources (i.e., property, plant, equipment and other physical technology); 2) human capital resources (i.e., knowhow, insight, judgement and experience of employees); 3) organizational resources (i.e., organizational culture, organizational systems, intellectual property rights and other intangible resources).

In order to provide competitive advantage, firm resources must have four attributes: 1) they must be *valuable*; 2) they must be *rare*; 3) they must be *imperfectly imitable*; and 4) they must be *non-substitutable* (Barney, 1991). However, organizations cannot expect to garner rents by merely owning and controlling resources. They should have the ability to deploy these resources in a manner that provides distinctive sources of advantage in the marketplace. Thus, it is necessary to look at firm capabilities and competencies to understand the sources of sustained competitive advantage.

## Resources, Capabilities and Competencies

Amit & Schoemaker (1993) define resources as stocks of available factors that are owned or controlled by a firm. Capabilities in contrast, refer to a firm's capacity to deploy resources using organizational processes to effect a desired end (Amit and Schoemaker, 1993). They are information-based, tangible or intangible processes that are firm-specific and are deployed over time through complex interactions among the firm's resources. Capabilities are often developed in functional and sub-functional areas by combining physical, human and technological resources. Unlike resources, capabilities are based on developing, carrying and exchanging information through the firm's human capital. Itmai (1987) refers to these as intangible or invisible assets.

Competencies pertain to an organization’s ability to deliver key success factors in an industry (McGrath, et al, 1994, 1995). Competencies allow a firm to achieve some purpose, preferably in a manner superior to those of other firms (Prahalad and Hamel, 1990). Hamel (1994) categorizes competencies into three types: 1) market-access competencies (all those competencies that help a firm maintain close proximity to its customers such as management of distribution and logistics); 2) integrity-related competencies (all those competencies that allow a firm to do things more quickly, flexibly or with a higher degree of reliability than competitors such as just-in-time inventory management); 3) functionality-related competencies (all those competencies that enable a firm to invest in products and services with unique functionality and distinctive customer benefits). In order to garner rents, a firm has to distinguish itself from its competitors in one or more of these competencies. Development of distinctive competencies depends on the degree to which a firm has generated idiosyncratic insights about how to deploy its resources and capabilities, idiosyncratic resource combinations it might possess or idiosyncratic routines (McGrath et al, 1994).

Resources and capabilities are antecedents of competence. While resources and capabilities might be acquired in factor markets, competencies must be accumulated internally over a period of time by choosing appropriate time paths for resources and capabilities. This accumulation process is characterized by 1) time-compression diseconomies (a competence may require a long period of time to develop); 2) historical uniqueness (a resource is acquired under nonreplicable condition such as a distinctive location, or first mover-advantage); 3) embeddedness of resources (the value of a resource may be inextricably linked to the presence of another complementary resource); and 4) causal ambiguity (the connection between a firm’s resource and its performance may be unclear) (Dierickx and Cool, 1989; Rumelt, 1984). Consequently, competencies are difficult to develop and cannot be easily imitated or substituted. Hence, firm competencies are a source of sustained competitive advantage. Resources and capabilities are inputs to the process of accumulating competencies. The effectiveness of this process and the time required to develop competencies may be enabled or inhibited by several contextual factors such as top management vision and support, company financial position and the organization’s innovation potential.

### IT and Sustainable Competitive Advantage

Based on the above discussions it is apparent that IT resources and capabilities may not directly lead to sustained competitive advantage. Instead, they can be leveraged to develop firm competencies that are sources of competitive advantage.

1 depicts the relationships between IT resources, capabilities and IT-enabled competencies. Resources are IT related factors controlled by a firm which include the IT infrastructure, IT technical human resources and IT managerial human resources. IT capabilities pertain to an IS units ability to perform its functions efficiently and effectively. Critical IT capabilities include IS planning, systems development and implementation, IT project management, end-user computing management, outsourcing management, IT-business relationship management and IT human resources management. Table 1 summarizes the IT resources and capabilities.

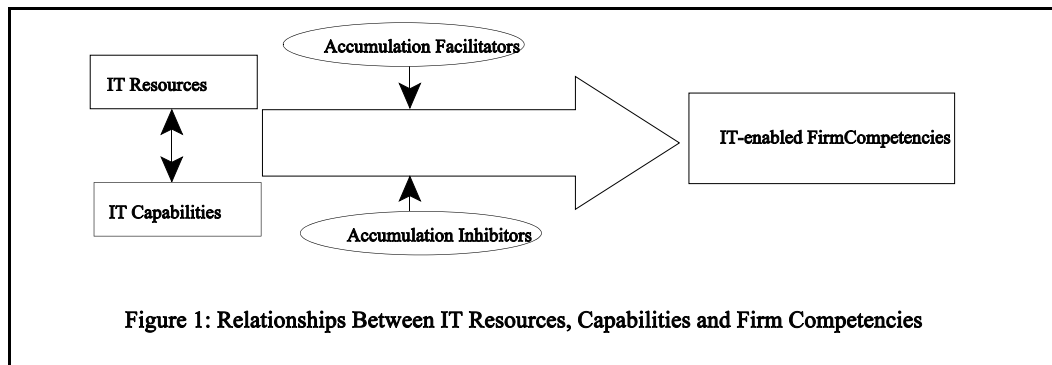


Figure 1: Relationships Between IT Resources, Capabilities and Firm Competencies

These resources and capabilities can be used to enable and enhance a firm’s competencies on several dimensions such as efficiency, customer orientation, supplier orientation, synergy, flexibility and learning (Table 2). These competencies match well with the three types of competencies identified by Hamel (1994) and represent the ones that

have been frequently emphasized in the IS and strategy literatures. However, we believe that this is not a comprehensive list of IT-enabled competencies but just those that have been emphasized in recent studies.

Recent studies in IS support our basic premise that IT-enabled competencies provide sustained competitive advantage to firms. For example, Clemons (1991) argued that competitive advantage does not necessarily come from innovatively using the newest technology or from systems done well. Lasting competitive advantage comes from using IT to support what the firm does well and add value to resources that the firm possess. Thus, the timing of technology acquisition or innovative applications development may not be a critical issue in sustained competitive advantage, rather it is complementarity between IT and firm resources and the uniqueness of the process used to develop IT-enabled competencies. In a recent study of IT use in the retail industry, Powell & Dent-Micallef (1997) found that technology resources did not yield significant advantage to firms. But, they found that complementarity between IT resources and the firm’s human and business resources explained significant variance if firm performance. They argued that since IT has become prevalent, most retailers have comparable IT resources and capabilities which are relatively easy to acquire in factor markets. However, using the technology resources to leverage

complementary business resources is a challenging endeavor. This process is idiosyncratic to a firm, cannot be easily imitated or substituted and thus is a source of lasting competitive advantage.

We believe that the concept of complementarity is critical in understanding how firms develop rent yielding IT-enabled competencies. Our current research efforts are directed at defining complementarity between IT and firm resources, identifying its dimensionality and systematically examining the relationships between complementarity, IT-enabled competencies and firm performance.

### *References*

References available upon request from (first) author.

**Table 1. IT Resources and Capabilities**

IT Resources and Capabilities	Characteristics	Components
<b>IT Resources</b>	“Having” Externally available & transferable Owned or controlled by the firm	IT Infrastructure IT Technical Human Resources IT Managerial Resources
<b>IT Capabilities</b>	“Doing” Organizational processes Firm specific	IT Planning IT-Business Relationship Management Systems Development and Implementation IT Project Management IS Human Resource Management IS Operation Management and Control Outsourcing Management

**Table 2. IT Enabled Competencies**

Competency	Typical Indicators of Competency	References
Efficiency	Operational efficiency and functional effectiveness	Bako and Treacy (1986), Treacy and Wiersma (1993)
	Integration of internal processes	Ward and Griffiths (1996)
	Organizational decision making	Ward and Griffiths (1996)
	Interorganizational efficiency	Bako and Treacy (1986)
Customer Orientation	Customer intimacy	Treacy and Wiersma (1993)
	Customer service	Robinson and Stanton (1987)
	Product leadership/innovation	Treacy and Wiersma (1993), Robinson and Stanton (1987)
Supplier Orientation	Supplier relationship	Iacovou, et al., 1995
	Links to Suppliers	Ward and Griffiths (1996), Mukhopadyay, et al., 1995
Synergy	Consensus	Rockart and Short (1989)
	Teamwork	Rockart and Short (1989)
Flexibility	Process redesign	Hammer and Champy (1993)
	Fluidity of coordination	Jarvenpaa and Ives (1994)
Learning	Open communication	Zuboff (1988)
	Creating and Sharing Knowledge	Sawy and Bowles (1997)