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Information Technology, Core Competencies, and Sustained Competitive Advantage

TERRY ANTHONY BYRD, Auburn University, USA

The value of information technology (IT) in today's organizations is constantly debated. Researchers and practitioners have examined organizations to try to discover causal links between competitive advantage and IT. This paper presents and details a model that depicts a possible connection between competitive advantage and IT. Furthermore, this paper attempts to show how one major component of the overall IT resources, the IT infrastructure, might yield sustained competitive advantage for an organization. More precisely, IT infrastructure flexibility is examined as an enabler of "core competencies" that have been closely related to sustained competitive advantage in the research literature. The core competencies enabled by IT that are the focus of this study are mass customization and time-to-market. By showing that IT infrastructure flexibility acts as an enabler of these competencies, the relationship to sustained competitive advantage is demonstrated.

INTRODUCTION

A fiercely competitive business environment is an omnipresent reality in many commercial industries today. Forces such as global competition, ever changing consumer attitudes, rapidly decreasing cycles of technological innovations, social and cultural upheavals, and instantaneous access to widespread information have been catalysts of this competitive climate. These competitive pressures have prompted business organizations in virtually every industry to institute radical organizational initiatives and mandates to do battle among themselves. In recent years, senior management in large and small organizations has tried many different maneuvers such as total quality management (Choi and Behling, 1997), reengineering (Hammer, 1990; Hammer and Champy, 1993), downsizing (Robbins and Pearce II, 1992), rightsizing (Zeffane and Mayo, 1994), and flatten organizational structures (Daft and Lewin, 1993; Heydebrand, 1989) to stay competitive or to gain a sustained competitive advantage.

Many researchers and practitioners have advocated using information technology (IT) as a source of competitive advantage (Benjamin, Rockart, and Scott Morton, 1984; Clemons, 1986, 1991; Feeny, 1988; King, Grover, and Hufnagel, 1989; Neo, 1988; Parsons, 1983; Porter and Millar, 1985). Companies, such as Wal-Mart, American Airlines, and Baxter International, have been cited as corporations that gained sustained competitive advantage from IT. This paper investigates this concept of IT being an agent of competitive advantage and attempts to show how one major component of the overall IT resource, information systems (IS) infrastructure flexibility, might yield sustained competitive advantage for a firm. More precisely, IS infrastructure flexibility is examined through its relationships as an enabler of core competencies that have been closely linked to sustained competitive advantage in the management literature. The core competencies that are closed linked here with IS infrastructure flexibility are mass customization and time-to-market.

At one time, the competitive value of IT was thought to come from so-called strategic information systems (SISs) (Reich and Benbasat, 1990; Sabherwal and King, 1995; Sabherwal and Tsoumpas, 1993; Wiseman, 1988). SISs change the goals, operations, products, or environmental relationships of organizations to help them gain an advantage, at least temporarily, over other companies in their industry (Wiseman, 1988). During the 1980s and early 1990s, strategic systems like American Airlines' Sabre System (Hopper, 1990), Digital Equipment Corporation's XCON (Sviokla, 1990), Federal Express's tracking and sorting system (Stahl, 1995), and Baxter's International ASAP system (Scott, 1988) were popular. Many companies were desperately trying to develop their own SISs to win customers and market share.

However, some recent research evidence has cast doubt on the ability of SISs to sustain competitive advantage for their companies. Mata, Fuerst, and Barney (1995) reasoned

Manuscript originally submitted July 8, 1999; Accepted November 11, 1999 for publication.

that proprietary technologies like SISs are becoming increasingly difficult to keep proprietary. They noted that a wide variety of factors – workforce mobility, reverse engineering, and formal and informal technical communications – are present to disseminate detailed information about proprietary technology like SISs. Kettinger, Grover, Subashish, and Segars (1994) provided evidence that companies implementing SISs typically did not maintain their competitive advantage over time without other factors being present. In their study, they uncovered information that the preexistence of unique structural characteristics is an important determinant of SISs' outcomes, that is, whether they provide sustained competitive advantage or not. Neumann (1994) also rationalized that SISs need complementary assets to lead to sustained competitive advantage. Without such interrelated assets, he demonstrated that any technology can be easily imitated thus losing its competitive advantage.

In studying the research on the ability of SISs to maintain a competitive edge, one theme seems to permeate throughout. Focus always falls on the importance of the technical foundations of the firms implementing SISs. Capabilities like "unique structural characteristics" (Kettinger et al., 1994), "complementary assets" (Neumann, 1994), "managerial IT skills" (Mata et al., 1995), and "structural differences", (Clemons and Row, 1991) are nearly always used in connections with the ability of SISs to maintain competitive advantage. Kettinger and his colleagues (1994) discovered that one of these structural capabilities that seemed to make a difference was the technological platform, or infrastructure. Davenport and Linder (1994) also stated that the success of the few companies with SISs really was derived from long-term, well-planned investments in networks, databases, and applications, rather than ingenious individual applications. These networks, databases, and applications are components of an organizational IS infrastructure (Duncan, 1995). In light of all these discoveries, researchers now emphasize that the search for competitive advantage from IT has shifted from SISs to the strategic value of IS infrastructure (Davenport and Linder, 1994).

Researchers and practitioners alike have taken note of the potential value of an organization's IS infrastructure. In fact, the growing strategic value of the IS infrastructure is almost undeniable. IS infrastructure expenditures account for over 58 percent of an organization's IT budget, and the percentage is growing at 11 percent a year (Broadbent and Weill, 1997). Some even have called IS infrastructure the new competitive weapon and see it as being crucial in developing sustained competitive advantage (Boar, 1993, 1997; Davenport and Linder, 1994). Rockert, Earl and Ross (1996) reflect the ideal goals of an IT infrastructure in stating:

> … an IS infrastructure of telecommunications, computers, software, and data that is integrated and interconnected so that all type of information can be expeditiously – and effortlessly, from the users viewpoint – routed through the network and redesigned processes. Because it involves fewer manual or complex computer-based interventions, a 'seamless' infrastructure is cheaper to operate than independent, divisional infrastructures. In addition, an effective infrastructure is a prerequisite for doing business globally, where the sharing of information and knowledge throughout the organization is increasingly vital.

From these statements, the strategic value of the IS infrastructure seems to be growing.

McKay and Brockway (1989) called IS infrastructure the enabling foundation of shared IT capabilities upon which the entire business depends. Weill (1993) also noted that IS infrastructure was a foundation for capability across business units or functional units. Davenport and Linder (1994) referred to IS infrastructure as that part of the organization's information capacity intended to be shared among all departments. They concluded that an IS infrastructure is a firm's institutionalized IT practice – the consistent foundation on which the specific business activities and computer applications are built. Congruent with these others, Duncan (1995) described IT infrastructure as a set of shared, tangible IT resources forming a foundation for business applications. The tangible IT resources composing an IS infrastructure are platform technology (hardware and operating systems), network and telecommunication technologies, data, and core software applications (Duncan, 1995).

As indicated by these statements, an IS infrastructure is the keystone for the development of business applications and the backbone for electronic communications in an organization. It also follows that the development of an IS infrastructure is arguably the most important aspect of managing IT resources in an organization. Based on the above definitions and descriptions from the literature, IS infrastructure in this study is defined in this paper as follows:

IS infrastructure is the shared, IT resources of hardware, software, communication technologies, data, and core applications that provide a unique technological foundation (1) for widespread communications interchanges across an organization and (2) for the design, development, implementation, and maintenance of present and future business applications.

Unique characteristics of an IS infrastructure determine the value of that infrastructure to an organization. Duncan (1995) wrote, "One firm's infrastructure may make strategic innovations in business processes feasible, while the characteristics of competitors' infrastructure may likewise cause their inability to imitate the innovation rapidly enough to mitigate the first mover's advantage. This set of characteristics has been loosely described as infrastructure 'flexibility' " (page 38). It is this characteristic of IS infrastructure that has captured much of the attention of researchers and practitioners. In fact, in most recent surveys featuring the issues most