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Journal of Strategic Information Systems 13 (2004) 167–194

*Strategic
Information
Systems*

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Beyond strategic information systems: towards an IS capability

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Received 30 March 2002; accepted 25 February 2004

Available online 21 April 2004

Abstract

The evolution of information technology (IT) in organizations is often portrayed as following three eras—Data Processing, Management Information Systems, and Strategic Information Systems (SIS)—each displaying distinct characteristics regarding the application of IT and having different objectives. While investments in IT continue to be made for both efficiency and effectiveness purposes, the SIS era is premised on management proactively seeking out opportunities for competitive advantage through IT, with approaches to information systems (IS) strategy formulation accommodating the requirement for both alignment of IS/IT investments with corporate strategy and assessing the disruptive impact of technology and the options for its use in shaping business strategy. Frameworks, methodologies and tools have been developed to support the objectives of the SIS era, yet the mechanisms through which organizations achieve repeated and sustained value from IT has received scant attention. Drawing on resource-based theory, this paper proposes a perspective on the management of IT in organizations that specifically considers how organizations can continuously derive and leverage value through IT. The analysis moves beyond a focus on identifying ‘strategic systems’ and develops the concept of an IS capability, suggesting that it heralds the arrival of a new era. The paper presents a model of an IS capability, outlines its core components and illustrates its application.

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Keywords: Information systems strategy; Competitive strategy; Sustainable competitive advantage; Resource-based theory; Information systems competencies; Information systems capability

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1. Introduction

Today, most organizations in all sectors of industry, commerce and government are fundamentally dependent on their information systems (IS) and would quickly cease to function should the technology that underpins their activities ever come to a halt. In the words of Rockart (1988), '[i]nformation technology has become inextricably intertwined with business'. Indeed, in industries such as telecommunications, media, entertainment, and financial services, where the product is already or is being increasingly digitized, the mere existence of an organization crucially depends on the effective application of information technology (IT). With the advent of e-commerce, the use of technology is becoming just an accepted, often expected, way of conducting business transactions—what has been referred to as the 'strategic necessity hypothesis' (Clemons and Row, 1991; Floyd and Wooldridge, 1990; Powell and Dent-Miscallef, 1997). Consequently, commercial organizations are increasingly looking towards the innovative application of technology to provide them with a source of competitive advantage. Even in the public sector, the push towards e-government has seen the imposition of greater technology use to deliver services.

While early IT implementations were clearly focused on the automation of clerical and repetitive tasks, the proactive search by organizations for opportunities to leverage IT for business advantage began in the late 1970s and early 1980s. Indeed, it is widely accepted that the evolution of IT in organizations to date can be captured in three 'eras': data processing (DP), management information systems (MIS), and strategic information systems (SIS) (Somogyi and Galliers, 1987). Each era displays distinct characteristics regarding the application of IT and has different objectives—although the objectives of the DP and MIS eras are, strictly speaking, a subset of the SIS objective to improve competitiveness. Even today, many investments are made in IT not for any competitive advantages but for efficiency and effectiveness reasons. While this three-era perspective is easy to criticize as being over-simplistic, it has not only proved popular with theorists and researchers but frame practice.

Within the SIS era, the formative writings on IS, IT and competitive advantage presented predominantly descriptive accounts of organizations that had achieved competitive advantage through the innovative application of technology and outlined the nature of that advantage (c.f. Bakos and Treacy, 1986; Cash and Konsynski, 1985; Ives and Learmount, 1984; King, 1978; McFarlan, 1984; Porter and Miller, 1985). A central prescription drawn from these early studies was that investments in IT should be formally planned for and aligned to corporate strategy (c.f. Earl, 1989; Henderson and Venkatraman, 1993; Venkatraman, 1991; Wiseman, 1985). The disruptive impact of IT on industries has also been recognized (Bower and Christensen, 1995; Christensen, 1997; Christensen and Overdorf, 2000; Sampler, 1998) requiring that any analysis must incorporate this aspect in strategy development. Consequently, the necessity to consider both *alignment* and *impact* has become established in the process of IS/IT strategy formulation. Models, frameworks and approaches have been developed to incorporate these aspects (e.g. Earl, 1989; Wiseman, 1985) and the success factors for this process have also been determined (Lederer and Mendelow, 1987; Teo and Ang, 2001; Wilson, 1989).

Yet, despite this call for *formal* strategic planning of IS/IT investments, Ciborra (1994) has asserted that successful applications of IT are often due more to serendipity rather than to any formal planning process. Indeed, most of the cases and examples of competitive advantage that have found their way into the literature are ‘one-off’ instances within particular organizations. An empirical study by Kettinger et al. (1994) evaluating longitudinal changes in performance measures of 30 firms that had been cited as ‘classic’ cases of strategic use of IS during the 1980s strongly suggested a healthy skepticism concerning the competitive advantage payoffs of IT. This research highlighted that any advantage these companies may have gained was short-lived and not enduring.

Although an organization may gain some ‘first mover advantage’ through an application of technology, it can be quickly copied and is therefore not an advantage which is sustainable (Clemons and Row, 1991; Mata et al., 1995; Senn, 1992), particularly when patent protection for IS applications is almost non-existent and where keeping an IS innovation secret is difficult, especially for systems used by customers or suppliers. Indeed, there is a strong argument that the use of standard applications packages, a common strategy today, can limit an organization’s ability to innovate (Davenport, 1998; Prahalad and Krishnan, 1999). At the same time, investments made in technology infrastructure are becoming ever more significant and inappropriate decisions in this area can severely affect an organization’s agility—its ability to respond swiftly to changing market conditions—and can become a significant competitive liability (Broadbent and Weill, 1997; Broadbent et al., 1999; Keen, 1991). Increasing use is also being made today of the external marketplace to furnish IT infrastructure and services to provide not just this flexibility but also cost savings and access to expertise (Kern and Willcocks, 2001; Lacity and Hirschheim, 1995; Lacity et al., 1995, 1996), an option which is available to all competing firms.

A central message from the research literature, and one that is universally accepted, is that technology itself has no inherent value and that IT alone is unlikely to be a source of sustainable competitive advantage. The business value derived from IT investments only emerges through business changes and innovations, whether they are product/service innovation, new business models, or process change, and organizations must be able to assimilate this change if value is to be ultimately realized. This is well understood and is reflected in the nature of the IT investments made by most organizations in the 1990s. The consequential focus has been mainly on a combination of redesign, re-organizing, rationalizing and integrating internal processes using new software suites and increasing connectivity with consumers, customers, suppliers and other trading partners, to reduce the cost of business transactions and improve, develop and create relationships via IS/IT.

In this paper, we seek to move beyond the principles and canons of the SIS era that have dominated both the research agenda and practice over the over the last 20 years in the competitive application of IT. In particular, we want to move on, away from the focus on ‘strategic information systems’¹, and concentrate on the issue of sustainability and the attainment of continuous value through IT. We introduce the concept of an *IS capability* and argue for organizations to understand, develop and nurture this capacity if they are to

¹ Reponen (1993) defines strategic information systems as “information systems which are designed to bring competitive advantage or have resulted in a competitive edge” (p. 101).

deliver value from investments made in IT on an ongoing basis. We also suggest that it represents the beginnings of a new fourth era in the evolution of the deployment and use of IT in organizations.

Bharadwaj (2000) notes that IS capability “is not so much a specific set of sophisticated technological functionalities as it is an enterprise-wide capability to leverage technology to differentiate from competition” (p. 186). In short, the IS capability is embedded within the fabric of the organization. It can be tacit and difficult to identify but the presence and effectiveness of the capability is reflected in business performance. To date the IS literature has not defined an IS capability beyond an expression of its core objective of enabling an organization to continuously derive and leverage business value through IS/IT. Nor has it described the fundamental components or characteristics of organizational IS capability. This presents a serious challenge for managers who seeking to improve their organizations’ IS capability as there is little guidance as to *what* and *how* organizational elements and resources contribute towards both its development and expression. The objective of this paper is to define and describe organizational IS capability, develop a model linking resources with this IS capability, and illustrate how it effects business performance.

The paper first reviews the literature that explores the sustainability of IT-based competitive advantage. It then moves on to introduce resource-based theory (RBT), suggesting that it is a theoretical construct that is suited to explaining the basis of sustainable competitive advantage through IT. Having explored the elements of RBT and introduced key concepts, the paper reviews the application of RBT in the context of IT strategy and management. The emerging fourth era is then described and a model of organizational IS capability is developed and presented. The paper concludes by illustrating how the IS capability impacts business performance.

2. IS and competitive advantage: in search of sustainability

The strategic management discipline has long sought to elicit the sources of sustainable competitive advantage² and there is a significant body of research focused on this objective (e.g. Peteraf, 1993; Porter, 1985; Rumelt, 1991). In assessing this literature, it is, however, important to make a distinction between *sustainability* and *competitive advantage*. Competitive advantage is an outcome³; sustainability is an ongoing state existing “after efforts to duplicate that advantage have ceased” (Barney, 1991, p. 102). As an outcome, a particular competitive advantage may be short lived, and is increasingly likely to be so when considering IT-based advantage. What is therefore required is to

² Hamel and Heene (1994) have written that “[s]ustaining a profitable existence and thus creating welfare and reduced poverty in society is the basic mission of any company. Academics (as well as consultants) should develop concepts, techniques, approaches and frameworks to assist business people in fulfilling this basic mission. Based on this general mission, a theory of strategic management should primarily focus on the dynamics of ‘sustainable competitive advantage’ as one of the most prominent driving forces for long-term profitability and survival” (p. 315).

³ Barney (1991) notes that an organization is said to “have a competitive advantage when it implements a value creating strategy not simultaneously being implemented by any current of potential competitors” (p. 102).

understand the mechanisms and processes that lead to the situation where an organization repeatedly and continually realizes outcomes producing advantage in the marketplace, through the deployment of IS/IT.

Since the early 1990s there has been interest in exploring the essence of sustainability of competitive advantage from IT (c.f. Atkins, 1998; Clemons and Row, 1991; Dehning and Stratopoulos, 2003; Feeny and Ives, 1990; Galliers, 1993, 1999; Hidding, 2001; Mata et al., 1995; Mykytyn et al., 2002; Powell and Dent-Micallef, 1997), although this domain of study is not well developed. From an IS perspective, sustainability can be defined as simply an organization's ability continually to deliver explicit business value from IS investments. It is this ability that is enduring rather than any outcome, for example, a new system that provides advantage which, as we have argued, is likely to be short lived. However, for an organization to develop this capability is a multifaceted and complex challenge. It requires understanding how IT impacts the business, identifying new strategic opportunities, assessing technological innovations, deriving new technology-enabled business models, prioritizing investment opportunities, managing IT-enabled change, implementing the appropriate technology, managing IS projects, managing vendors, exploiting investments in technology, ensuring appropriate usage of the IS, that employees embrace the right behaviours and values to work with information, that the value from the application is captured by the organization and that IT investment does not become a source of competitive disadvantage. The challenge for researcher and practitioner alike is to understand what contributes towards the development of these aspects of sustainability. Insights which address this question have been provided by research over the last decade; Box 1 highlights some key findings from these studies.

Box 1.**Building the IS capability: findings from the research literature (listed in chronological order)**

- "When every leading firm in an industry has access to the same technology resource, the management difference determines competitive advantage or disadvantage." (Keen, 1993)
- "The attainment of sustained IT-based competitive advantage may be more a process of building organizational infrastructure in order to enable innovative action strategies as opposed to "being first on the scene"" (Kettinger et al., 1994)
- "Successful application of IT are often due more to serendipity rather than any formal planning" (Ciborra, 1994)
- "Only IT management skills are likely to be a source of sustainable competitive advantage (SCA)." (Mata et al., 1995)
- "Some firms have gained advantage by using IT to leverage intangibles, complementary human and business resources, such as flexible culture, strategic planning-IT integration, and supplier relationships" (Powell and Dent-Micallef, 1997)

- “What distinguishes companies deriving significant value from IT is not technical wizardry but the way they handle their IT activities” (Dvorak et al., 1997)
- “Companies must do more than excel at investing in and deploying IT. They must combine those capabilities with excellence in collecting, organising and maintaining information, and with getting their people to embrace the right behaviours and values for working with information” (Marchand et al., 2000)
- “Results from this study...suggest that the inconsistent statistical findings about the relationship between IT and firm performance may be attributed to our incomplete understanding of the nature of a firm’s resources and skills and to the fact that IT investment dollar serves as a poor surrogate for assessing a firm’s IT intensiveness. ...IT-capability is not so much a specific set of sophisticated technological functionalities as it is an enterprise-wide capability to leverage technology to differentiate from competition” (Bharadwaj, 2000)
- “Based on prior literature, we predicted that companies with superior managerial IT skills are more likely to sustain an IT-enabled competitive advantage. Our empirical analysis offers strong evidence in support of this argument. ...We find no evidence that technical IT skills or IT infrastructure contributes to the duration of competitive advantage” (Dehning and Stratopoulos, 2003)

In an analysis of some of the early examples of IS/IT and competitive advantage, Kettinger et al. (1994) concluded that the attainment of sustained IS based competitive advantage may be the result of building ‘organizational infrastructure’ in order to enable innovative and adaptive action strategies. More recently, Powell and Dent-Micallef (1997) investigated the linkages between IT and firm performance in the retail industry, asserting that IT alone is not enough. From their study, they concluded that some firms have gained advantage by using IT to leverage intangibles, complementary human and business resources and relationships.

In a conceptual analysis of IT and competitive advantage, empirically supported by Dehning and Stratopoulos (2003), Mata et al. (1995) concluded that *only* IS management skills are likely to be a source of sustained competitive advantage. They described these skills as the ability of IS managers to understand and appreciate business needs; their ability to work with functional managers; the ability to co-ordinate IS activities in ways that support other functional managers; and the ability to anticipate future needs. They suggest that in the search for IS-based sources of sustainable competitive advantage, organizations must focus less on IT, per se, and more on the process of organizing and managing information, systems and technology within a firm. Further support for this position is provided by Dvorak et al. (1997) who noted that what distinguishes organizations with high performance IT is not technical wizardry but the way they manage their IT activities. Keen (1993) argues that the “wide difference in competitive organizational and economic benefits that companies gain from this IT rests in a management difference and not a technical difference. Some business leaders are

somehow able to fit the pieces together better than others.” Ross et al. (1996) and Bharadwaj (2000) have concluded that applying IT to enhance competitiveness depends on the development of an effective IS capability.

While not explicitly using these words, a number of scholars have also alluded to the notion of an IS capability in their research findings. In his study of SIS planning, Earl (1993) essentially described an IS capability with his ‘organizational approach’. Ciborra’s (1994) concept of ‘serendipity’ could be interpreted as a consequence of a well developed IS capability that was tacit and intangible. Kettinger’s et al.’s (1994) description of ‘organizational infrastructure’ can be understood in a similar way to how IS capability is described in this paper. To date, the IS literature has not articulated the exact nature of this capability. While we shall elaborate in some detail on its content and substance later in this paper, it essentially represents the organizations ability to: “to connect...technology to its business performance” (Marchand et al., 2000, p. 69).

3. A resource-based perspective of competitive advantage

In the strategic management discipline, the resource-based view of the firm offers a perspective distinct from the traditional industrial economics viewpoint that has dominated the field for the last 50 years. An increasing body of literature grounded in this perspective points to the importance of internal firm-specific factors in explaining variations in the performance of organizations, particularly over a period of time (Barney, 1986a,b; Bogner and Thomas, 1994; Cool and Schendel, 1988; Deutsch et al., 1997; Hansen and Wernerfelt, 1989; Jacobson, 1988; Rumelt, 1991; Wernerfelt, 1984, 1995). A basic assumption of RBT is that resources are distributed heterogeneously across organizations (Barney, 1991).⁴ RBT argues that it is processes of resource accumulation and deployment that lead to idiosyncratic endowments of proprietary assets (Collis and Montgomery, 1995; Dierickx and Cool, 1989; Peteraf, 1993; Prahalad and Hamel, 1990; Wernerfelt, 1984) and provide the source of sustainable competitive advantage (Teece et al., 1997).

Although the resource-based view has only come to prominence in the last 20 years, its origins stem back to the seminal works of Coase (1937), Penrose (1959) and Wrigley (1970). Penrose (1959) noted that a firm can be viewed as “a collection of human and physical resources bound together in an administrative framework, the boundaries of which are determined by the area of administrative coordination and authoritative communication” (p. 7), a perspective not too dissimilar from that of Hamel and Prahalad (1994) who portray an organization as a ‘portfolio of competencies’. Developments in RBT have also been influenced by Nelson and Winter’s (1982) *evolutionary perspective* which highlights the ‘stickiness’ of a firm’s resource endowments and their dependence on learning trajectories and technological opportunities.⁵

The implications of RBT for strategy formulation and implementation is that competitive advantage can be sustained by investing in inimitable idiosyncratic

⁴ It is not our intention to engage in a debate as to whether it actually a ‘view’ rather than a ‘theory’.

⁵ Barney (2001) has admitted that the first draft of his 1991 Journal of Management article was originally titled ‘An evolutionary theory of competitive advantage’.

competencies (Barney, 1991; Lippman and Rumelt, 1982; Winter, 1987). The resource-based view of the firm focuses on resource market imperfections and highlights the heterogeneity of firms, their varying degrees of specialization, and the limited transferability of corporate resources (Barney, 1986a,b, 1989, 1991; Coase, 1937; Conner, 1991; Dierickx and Cool, 1989; Peteraf, 1993; Wernerfelt, 1984).⁶ A key implication from this stream of research is that “[...] firms cannot expect to “purchase” sustained competitive advantages in the open market. Rather, such advantage must be found in rare, imperfectly mobile, and non-substitutable resources already controlled by a firm” (Barney, 1991, p. 117).

Despite the development of RBT, it is generally agreed in the strategic management literature that internal organizational assessment is less developed theoretically and practically than other areas of situational analysis (Barney, 1995; Duncan et al., 1998; Kiernan, 1993). Yet “[e]ffective strategic management requires an understanding of organizational resources and competencies as well as how each contributes to the formation of organizational strengths and ultimately to the development of a competitive advantage” (Duncan et al., 1998, p. 6).

There is also a lack of precision in the usage of the terms and concepts surrounding RBT and the literature is replete with often mutually contradictory definitions (Campbell and Sommers Luchs, 1997; Nanda, 1996) reflecting its immaturity as a theoretical perspective. For example, the distinction between ‘competence’ and ‘capability’ is not often made clear in the literature; indeed, both terms are more often than not used synonymously. For example, the study by Henderson and Cockburn (1994) uses the concept of ‘component competence’ to “include what others have called ‘resources’” (p. 65) and the concept of ‘architectural competence’, to “include what others have called ‘capabilities’” (p. 65). To introduce clarity and establish a context for developing a model of IS capability, this section introduces the key concepts of RBT: resources, competencies and capability and the definitions we have adopted.

3.1. Resources

Despite being essentially a theory concerned with organizational resources, it is perhaps indicative of the lack of clarity within the RBT literature that even at the level of resource confusion reigns, with statements like “...a valuable resource may be an organizational capability...” (Collis and Montgomery, 1995, p. 120); or portraying a firms resources as including “all assets, competencies, organizational processes, firm attributes, information, and knowledge that enables a firm to conceive of and implement strategies that improve its efficiency and effectiveness” (Barney, 1991). For the purpose of this paper, the definition of Amit and Schoemaker (1993) is subscribed to as it is precise and fits with the distinction between the concepts of resource, competence and capability.

⁶ In fact the concept of resources and capabilities in the field of strategic management emerged from research questions related to diversification. Wernerfelt (1984), often seen as the father of modern day RBT, built on economic theories to demonstrate that modeling the firm according to its resources leads to coherent diversification decisions by defining common non-financial links (see also Chatterjee and Wernerfelt, 1991).

They define resources as ‘stocks of available factors that are owned or controlled by the firm.’ The information, systems and technology owned or available to the firm are an increasingly important set of resources—often referred to as the IT infrastructure—but in the context of *IS management* the critical resources are the knowledge and skills residing in employees or the employees of third-party vendors.

3.2. Competencies

Central to the RBT perspective is the fact that resources, per se, do not create value (Bowman and Ambrosini, 2000; Penrose, 1959; Porter, 1991); value is created by an organization’s ability (or competence) to utilize and mobilize those resources. However, “there are almost as many definitions of organizational competence as there are authors on the subject” (Collis, 1994, pp. 144–145). Terms such as ‘distinctive competence’ (Hitt and Ireland, 1985; Snow and Hrebiniak, 1980), ‘core competence’ (Prahalad and Hamel, 1990); ‘firm-specific competence’ (Pavitt, 1991); and ‘invisible assets’ (Itami and Roehl, 1987) are used to convey what often seems to be similar meaning.

Here, competence refers to “a firm’s capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end” (Amit and Schoemaker, 1993, p. 35) and thus represent “...a bundle of skills and technologies rather than a single, discrete skill or technology” (Hamel and Prahalad, 1994, p. 202). Competence can therefore be portrayed as the ability to deploy combinations of firm specific resources to accomplish a given task (Teece et al., 1997; McGrath et al., 1995). They represent the collective knowledge of the firm in initiating or responding to change “that is built into the organization’s processes, procedures and systems, and that is embedded in modes of behaviour, informal networks and personal relationships” (Collis, 1996, p. 149–150).

3.3. Capability

Organizational capability refers to the strategic application of competencies (Kangas, 1999; Moingeon et al., 1998), i.e. their use and deployment to accomplish given organizational goals (McGrath et al., 1995; Teece et al., 1997). Within this context, defining and creating the desired organizational capability would be determined by its future goals: in turn this establishes the need for improving or developing specific competencies. Equally, an organization’s current capability, based on its existing competencies, will be either an enabler or inhibitor in terms of the goals it can actually achieve, at least in the short-term. For example, a bank’s ability to provide customers with flexible investment products may be as a result of its IS capability, where the IT infrastructure that is designed and implemented supports the provision and servicing of such products.

Capability is a meta-level construct. For example, competing organizations can have a manufacturing capability; however, the competencies underpinning this capability are likely be resourced differently in different organizations and the resources integrated and coordinated in different ways, depending on the context of each organization, including its history, people, and structural characteristics. Indeed, the capability itself may not be

recognized directly by external entities. For example, discount retailer Wall Mart has been portrayed as having a logistics and supply chain capability (Stalk et al., 1992), however, customers could more easily identify with the low prices this enabled them to charge rather than this capability.

4. The application of resource-based theory to IS management

Organizations have traditionally been structured so that all the resources considered necessary for managing IS are located in one area of the organization—generally called the IS function. Outsourcing results in many resources lying outside the IS function, yet this knowledge and skill must also be integrated and coordinated with internal stocks of knowledge and skill.

One way, therefore, to apply RBT to the management of IS is to focus on competencies within the IS function. This is the approach adopted by Feeny and Willcocks (1998, 1999), although they did note in their conclusion that “in this emerging field there is, as yet, little general agreement on the labeling or definition of the building blocks, or even on the level at which a competence is most appropriately identified” (p. 467). They have identified what they referred to as nine “core IT competencies”: IS/IT leadership, business system thinking, relationship building, architecture planning, making technology work, informed buying, contract facilitation, contract monitoring and vendor development.⁷

Research by Peppard et al. (2000) indicates that the competencies necessary for success with IS are not located solely within a single function area—specifically the IS function—and that they in fact transcend the functional boundaries of an organization. The framework underpinning this research is shown in Fig. 1 and is an extension of conventional business-IT alignment models, explicitly incorporating the notion of exploitation of IT by the organization to provide a more comprehensive explanation of success. Using this framework, the researchers identified six domains of IS competence which are themselves composed of a number of IS competencies—26 in all. These domains are: strategy, defining the IS contribution, defining the IT capability, exploitation, delivering solutions and supply, and are defined as follows:

Strategy	...the ability to identify and evaluate the implications of IT based opportunities as an integral part of business strategy formulation and define the role of IS/IT in the organization
Define the IS contribution	...the ability to translate the business strategy into processes, information and systems investments and change plans that match the business priorities (i.e. the IS strategy)
Define the IT capability	...the ability to translate the business strategy into long term information architectures, technology infrastructure and

⁷ They actually use the word ‘capabilities’ but their meaning is similar to how the concept of competence is used in this paper.

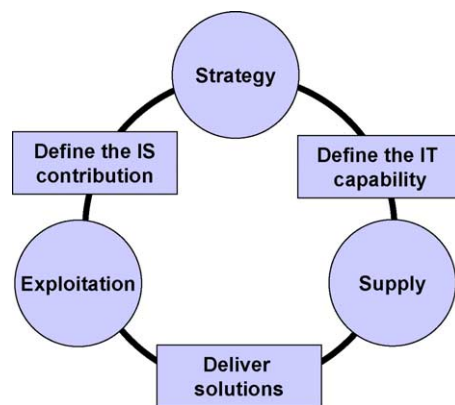


Fig. 1. A framework for positioning IS competencies (adapted from Peppard et al., 2000, p. 305).

	resourcing plans that enable the implementation of the strategy (i.e. the IT strategy)
Exploitation	...the ability to maximize the benefits realized from the implementation of IS/IT investments through effective use of information, applications and IT services
Deliver solutions	...the ability to deploy resources to develop, implement and operate IS/IT business solutions, which exploit the capabilities of the technology
Supply	...the ability to create and maintain an appropriate and adaptable information, technology and application supply chain and resource capacity

The 26 IS competencies are listed and defined in Table 1. It is at this level that an assessment of an organization’s abilities to deploy IS/IT successfully can be made (Peppard et al., 2000; Ward and Peppard, 2002).

What this research highlighted is that the resource elements, i.e. the knowledge and skills, underpinning these IS competencies are not located solely in the IS function. Consequently, IS competencies do not exist in any one functional area: this point is crucial and presents management with the challenge of establishing, developing and nurturing these competencies within the existing ‘functional’ structure. However, it is worth noting that the significant resource elements of the competencies within the ‘supply’ domain, often reside within the IS function. The case study presented in Peppard et al. (2000) highlighted that this organization assessed its performance of these ‘supply’ competencies relatively well, suggesting that this was probably due to the fact that resource elements underpinning these competencies were under the control and responsibility of the chief information officer. IS competencies within the other IS competence domains were assessed as being performed less well, and the analysis suggested that this was most likely due to their component resources being dispersed throughout the organization with no mechanisms in place to integrate and coordinate the underpinning resources of these competencies.

Table 1
Definition of IS competencies

Macro competence	Competence	The ability to...
1. Formulate strategy	1.1 Business strategy	Ensure that business strategy formulation identifies the most advantageous uses of information, systems and technology
	1.2 Technology innovation	Incorporate the potential of new and emerging technologies in long term business development
	1.3 Investment criteria	Establish appropriate criteria for decision making on investments in information, systems and technology
	1.4 Information governance	Define information management policies for the organization and the roles and responsibilities of general management and the IS/IT function
2. Define the IS contribution (IS strategy)	2.1 Prioritization	Ensure that the portfolio of investments in applications and technology produce the maximum return from resources available
	2.2 IS strategy alignment	Ensure that IS development plans are integrated with organizational and functional strategic plans
	2.3 Business process design	Determine how IS can deliver 'best practice' in operational processes and organizational activities
	2.4 Business performance improvement	Identify the knowledge and information needed to deliver strategic objectives through improved management processes
	2.5 Systems and process innovation	Carry out relevant R&D into how IS/IT can be used to create new ways of conducting business and new products and/or services
3. Define the IT capability (IT strategy)	3.1 Infrastructure development	Define and design information, application and technology architectures and organization structures and processes to manage the resources
	3.2 Technology analysis	Understand technology trends and make appropriate recommendations for organizational acquisition of technology and associated resources
	3.3 Sourcing strategies	Establish criteria and processes to evaluate supply options and contracts with suppliers
4. Exploitation	4.1 Benefits planning	Explicitly identify and plan to realize the benefits from IS investments
	4.2 Benefits delivery	Monitor, measure and evaluate the benefits derived from IS investment and use
	4.3 Managing change	Make the business and organizational changes required to maximize the benefits without detrimental impact on stakeholders
5. Deliver solutions	5.1 Applications development	Develop/acquire and implement information, systems and technology solutions that satisfy business needs
	5.2 Service management	Define service arrangements and performance criteria to match the business requirements including project management

(continued on next page)

Table 1 (continued)

Macro competence	Competence	The ability to...
	5.3 Information asset management	Establish and operate processes that ensure data, information and knowledge management activities meet organizational needs and satisfy corporate policies
	5.4 Implementation management	Ensure that new processes and way of working are designed and implemented effectively in conjunction with new technology
	5.5 Apply technology	Deploy new/changed technology in the most cost effective mode to deliver application benefits
	5.6 Business continuity and security	Provide effective recovery, contingency and security processes to prevent risk of business failure
6. Supply	6.1 Supplier relationships	Manage contracts and develop value added relationships with suppliers
	6.2 Technology standards	Develop and maintain appropriate standards, methods, controls and procedures for the use of IT and associated resources
	6.3 Technology acquisition	Develop and apply procurement policies and procedures for the organizational acquisition of infrastructure components and specialist technologies/services
	6.4 Asset and cost management	Ensure technology, information and application assets are effectively maintained and costs of acquisition and ownership are understood and managed
	6.5 IS/IT staff development	Recruit, train and deploy appropriate staff and ensure technical, business and personal skills meet the needs of the organization

5. A model linking the IS capability with IS competencies and resources

Building on the arguments presented above, a model can be constructed to represent the components of the IS capability. Influenced by the work of Caldeira (1998), this model has three levels: the resource level, the organizing level and the enterprise level (see Fig. 2). The *resource* level denotes the resource components that are the key ingredients of the IS competencies. In managing IS, these resources are the skills, knowledge and behavioural attributes of both employees and external providers. The *organizing* level is concerned with how these resources are mobilized and marshaled via structures, processes and roles to create IS competencies. It is, however, only at the *enterprise* level that the capability actually manifests itself and is ultimately recognized in the performance of the organization. It is worth highlighting that all organizations have an IS capability. For some, however, it may be weak and severely affects that organization's ability to affect or assimilate IS/IT related strategic change. Those with a strong IS capability can both leverage IS/IT enabled change for business advantage and also respond rapidly to changes in the business environment.

To illustrate the link between resources and the IS capability, the relationship between resources and the IS competencies is first developed. This is then followed by illustrating the link between IS competencies and the IS capability.

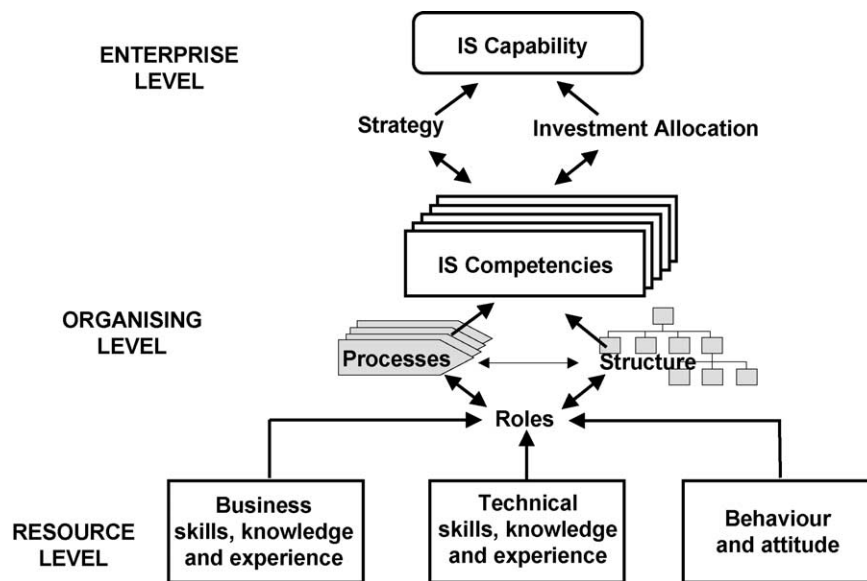


Fig. 2. A model of the IS capability.

5.1. From resources to IS competencies

In an organizational context, competencies are embedded in organizational processes (Stalk et al., 1992; Teece, 2000; and ‘business routines’ (Marino, 1996) and are bounded by the structure of the organization (Grant, 1996a,b). The expression of a particular competence in an organization depends on people applying their knowledge, integrating their knowledge, interacting with others and coordinating their actions—this they do by performing roles in organizational structures and processes. Individuals can, of course, contribute to a number of the IS competencies. A competence is an emergent property of organizational processes.

5.1.1. Processes

The conventional view of a process as ‘a set of activities’ has emerged out of manufacturing industry and it is a perspective that can be used in many aspects of managing the supply of IT and the delivery of information and systems. Methodologies for systems design, systems development and project management and service management, for example, define good practices for some of these processes. Less well defined are the processes that derive the value from the IS/IT investments and applications. These include formulating strategies, management decision making processes for investments in IS/IT, managing the organizational and business changes required to deliver value, and the responsibilities and accountabilities for realizing specific benefits. These activities essentially involve the collective knowledge—which is often tacit—and synchronized, interdependent behaviours to address tasks that are often context specific, rather than able to be performed according to a pre-defined process. Such a view is of particular relevance

in knowledge work, where bringing together specific knowledge and skills is critical to the ability to perform.

5.1.2. Roles

The concept of roles and role theory is useful in understanding the behaviour of individuals in both groups and organizations. The history of role theory dates from the 1930s, when sociologists and anthropologists studied roles as a key to explaining the origins of social behaviour (Linton, 1936; Mead, 1934). Since then, role theory has emerged as a recognized discipline (Biddle and Thomas, 1966). Building on the sociological roots of role theory, Graen (1976) developed a ‘role systems model’ in which behaviour in a particular role is the result of organizational demands, social demands and personal demands. Katz and Kahn (1978) applied similar ideas to their organizational role theory, which emphasizes organizational factors, interpersonal factors, and attributes of the person.

In an organization, an employee’s primary role is indicated by a position title and specified by a ‘job description’ (Cherrington, 1994). However, employees are likely to have to perform different roles at different times. In order that the organization can achieve its goals and objectives the work of individual members must be linked into a coherent pattern of activities and relationships and this is achieved through the ‘role structure’ of the organization (Mullins, 1993, p. 186). While roles can be tightly or loosely defined and have different degrees of discretion associated with them, they do encompass the expected behaviours attached to a position or job.

Human resource management theorists describe a range of attributes that distinguish the ability of an individual to perform a particular role (Ackerman and Humphreys, 1990; Belbin, 1993; Katz and Kahn, 1978; Maslow, 1987; Mullins, 1993; Schein, 1988; Staw, 1991; Weick, 1979). These are, as shown in Fig. 2:

- *Skills*. Know how of the job, which implies the physical ability to produce some action. This might be the ability to program in Java or draw data flow diagrams.
- *Knowledge*. Know what of the job, the ability to understand what the role demands of the person. For example, knowledge of what is involved in constructing an IS strategy or build relationships with vendors.
- *Behaviours and attitudes*. The personal attributes or aptitudes that make knowledge useful and enable skills to be acquired in the first place. Personal characteristics are important and indeed may be crucial in service oriented roles; for example, IS staff having empathy with users in delivering many IS services, particularly those with a high degree of user contact.

5.1.3. Structures

Structure is traditionally seen as being concerned with the systematic arrangement of people, departments and other subsystems in the organization. The structure of the organization can ultimately affect the performance of processes, particularly those that cross departmental or functional boundaries. The concept of business process re-engineering emerged as a consequence of the problems of functional organization

and called for a greater focus on work process, that typically cross organizational boundaries, in designing organizations.

5.2. From IS competencies to IS capability

It is only at the level of overall enterprise that IS capability actually manifests itself. The extent to which IS competencies contribute towards the IS capability is dependent on two aspects: the organization's *strategy* and *investment decisions*. Both determine whether the IS capability is a source of competitive advantage or merely a necessity for competitive parity, or is causing the organization to be at a competitive disadvantage. Although having an IS capability is a business imperative today, different organizations may choose to resource it in different ways, but almost all will rely on a combination of internal and external resources.

Barney (1997) refers to competencies as organizational characteristics that 'enable an organization to conceive, choose and implement strategies.' A firm could identify an advantage by conceiving an innovative strategy that depends on IT, but successfully implementing such a strategy will be dependent on the current status of the IT infrastructure, the organization's ability to successfully deploy appropriate resources as well as to implement and operate new processes and systems and unlock business value.

Similarly, succeeding with Enterprise Systems (ES), for example, is not as dependent on the technology and software applications as much as it is on the organization's capacity to implement and manage change (Davenport, 1998). Research highlights that the first implementation of an ES normally involves removing current problems and constraints to progress through more integrated processes and systems (Markus et al., 2000). This will undoubtedly cause many existing IS competencies to be re-assessed and improved to enable the organization to be operated and managed as a integrated whole, using information and systems in new and quite different ways. If successful, the organization will have an improved business and IS capability, which through further changes in business practices plus innovative extensions of its systems can produce new strategic opportunities.

6. The emerging fourth-era: the IS capability

To summarize the discussion in Section 5, resources are what an organization has under its control or at its disposal; competencies are the abilities of the organization to develop, mobilize and use those resources; capability is what the business can achieve through focused investment and deployment of competencies. In this section, the concept of IS capability is explored in more detail.

Drawing on prior published research, we have shown that while some organizations have managed to gain advantage from IT, very few have achieved it on a continuous and ongoing basis. Technology is no longer proprietary and is 'freely' available in the open market to all firms competing against each other. Competitors will soon catch up through imitation or even overtake the organization either through a more innovative application or by deploying newer and cheaper technology for a similar purpose. There is now a perpetual

requirement to innovate with IS/IT to effect change *and* to adapt business processes and practices to respond to change created by others, often referred to as agility. In this context, the IS capability can be portrayed as having three inter-related attributes: a fusion of business knowledge with IS knowledge, a flexible and reusable IT platform, and an effective use process. The IS capability in turn is underpinned by IS competencies—these were identified and discussed in Section 4.

Fusing IS knowledge and business knowledge is paramount to ensure the conception of strategies involving technological innovation, to make appropriate choices from the opportunities available and to implement these strategies quickly and effectively, including managing change. It also requires knowing the extent of change that the business is capable of absorbing.

Managing IS/IT and delivering business value is essentially a set of knowledge-based activities: a complex and multidimensional set of tasks and processes, incorporating many different but interdependent types of knowledge. It involves integrating and coordinating knowledge from many individuals from different disciplines and backgrounds, with varied experiences and expectations, located in different parts of the organization. This demands a close partnership between IS staff and business staff at all levels, both in formal processes and informal working relationships (Chan, 2002) and indicates why it is necessary to have a close relationship between IS professionals and other employees.

Of course, the wider the knowledge base being integrated, the more complex are the problems of creating and managing a particular IS competence. Hence, ‘exploitation’ competencies depend on integrating and coordinating knowledge from both inside and outside the IS function. Grant (1996a) believes that this integration is not possible without a structure for these competencies. This structure does not correspond with the organizational structure or hierarchy. Grant points out that the uniqueness of an organization’s knowledge base makes it impossible to offer a specific form of organization for exploiting knowledge.

In their research on outsourcing, Lacity et al. (1994) found that ‘numerous companies consider outsourcing partly for the access to greater IT knowledge it would bring’. But the challenge such organizations face is in integrating this external knowledge with existing internal knowledge. Perhaps it is the inability to exploit this combined knowledge base that explains why many organizations have experienced disappointing results from their outsourcing decisions. Indeed, Scarbrough (1998) argues that outsourcing decisions could be usefully viewed in terms of the ‘organization of knowledge’.

A flexible and re-usable IT infrastructure provides the technical platform, services and specialist resources needed to respond quickly to required business changes as well as the capacity to develop innovative IS applications supporting new process designs or business initiatives. This infrastructure is the supply-side component of the IS capability. Through the deployment of technical knowledge and skills, some of which may be bought in, the organization ‘creates’ an IT infrastructure that influences future options and speed of response but has a degree of permanence attached to it. The infrastructure can be viewed as the embodiment of knowledge and skill.

The IT infrastructure provides the shared foundation of the organization’s ability for building and using business applications. While many software applications are designed for one specific business purpose, other applications and most hardware, networks,

operating systems and databases are designed to be shared and to serve many business purposes. A major problem with IT infrastructure and associated services are that they are not always adequately planned for. The IS function has generally been ‘obliged to grow its IT infrastructure clandestinely, by small increments hung on the shirt-tails of particular applications for which a direct benefit can be demonstrated’ (Index Foundation, 1993). It is generally accumulated rather than designed to serve the business in times of change and consequently it is often rather fragmented and technically incompatible, at least in parts.

The IT infrastructure only defines the technological capability required to support the business and its strategy, if it adequately addresses the need for flexibility to deal with changing business needs and priorities. The nature of the IT infrastructure and the level of user IT skills have been shown to be two of the factors affecting organizational agility (Breu et al., 2002). Indeed, one of the reasons why organizations often choose outsourcing is the belief that the vendor will provide them with this flexibility; yet research findings show that this may not always be the case (Clark et al., 1998).

An effective use process to link IS/IT assets with value realization, through the application of the technology as well as creating an environment conducive to collecting, organizing and maintaining information, together with embracing the right behaviours for working with information (Marchand et al., 2000). The use process has two aspects: using the technology and working with information (Davenport, 1994; Davenport and Prusak, 1997; Marchand et al., 2000).

Technology by itself has no inherent value; this value must be unlocked, a task that can only be achieved by people. While it might seem somewhat superficial to state, technology must be actually used effectively for benefits to be delivered! This use takes place within business and management processes. Exploitation of the technology by deploying it to deliver business benefits requires knowledge and skills from within organizational functions and processes. However well the ‘IS/IT conversion process’ is executed, it is the ‘IS/IT use process’ that delivers the required value from the IS/IT assets created, in terms of the impact on organizational performance (Soh and Markus, 1995).

The use process is also concerned with information itself. Davenport (1994) recommends organizations to place more emphasis on ‘human-centered information management’ or ‘people-centered management activities’ aimed at improving behaviours and values in the ways people use and share information. This line of reasoning softens the temptation of organizations to focus solely on technology implementation.

7. A business change perspective of IS/IT and competitive advantage

Building on debates in the RBT literature and the above discussion, the extent and caliber of an organization’s IS competencies will either increase or limit its ability to make the right choices from the options for change from the use of IT. From this perspective, the IS competencies define the organization’s ability to identify and deliver successfully IS/IT related changes, in relation to the business demand-side drivers which cause the changes the organization has to make or wants to make, in the context of ever changing supply-side options (see Fig. 3).

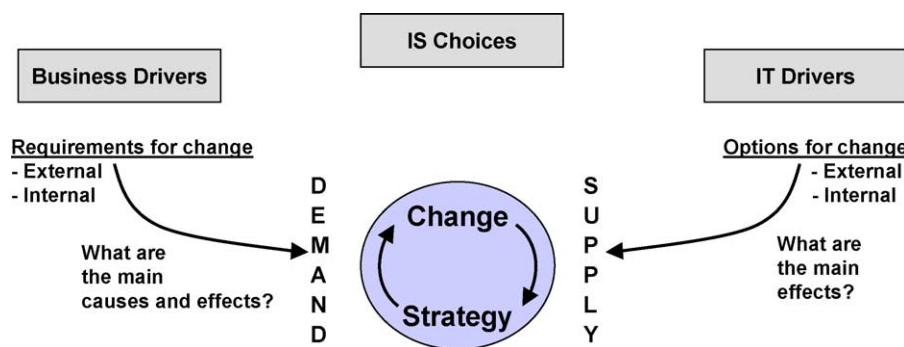


Fig. 3. IS strategy balances the demands for business change with the supply of IT enablers.

The development and/or acquisition of IS competencies when both demand and supply are subject to change, at the same time, is obviously complex and how an organisation addresses that complexity will be influenced by the underlying philosophy it adopts in strategic decision making. Although the nature of strategic choice and decision making varies amongst organizations, there are some broad similarities. In the ‘Anglo-American’ business culture, strategic change has tended to be target driven. Typically, this begins with a definition of desired outcomes—the *ends*—and then works backwards to find *ways* of achieving them and to determine the resources required—the *means* (see Fig. 4). This approach assumes that, regardless of the demands made by strategic change projects, the business will be able to find the necessary ways and means to achieve them. When this proves impossible, a change project will, at best, be only partially successful. The strong focus on measures in relation to strategic objectives can also create problems in the Anglo-American model. In particular, if the links between objectives and measures are not entirely clear, people will tend to focus on what is being measured, sometimes to the exclusion of equally critical but hard-to-measure elements of the change project or programme.

The ‘Japanese’ model of strategic change has traditionally been the reverse of the ‘Anglo-American’ version. Rather than working top-down from a strategic plan or vision,

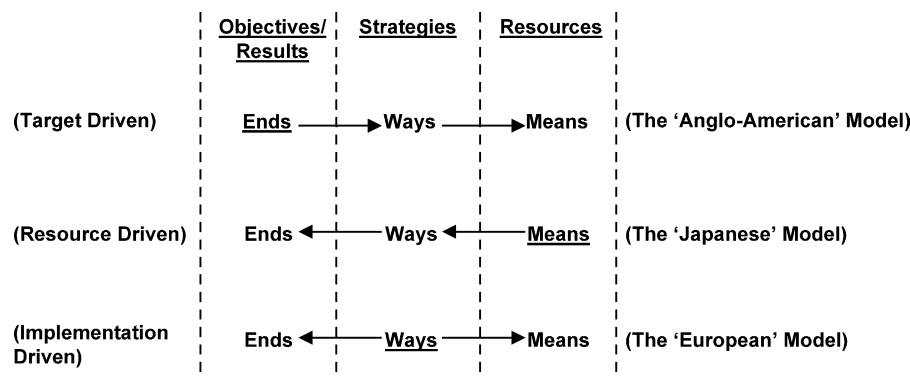


Fig. 4. Different strategic philosophies.

strategy has been driven bottom-up by identifying opportunities to exploit existing competencies and resources—the *means*. Consensus is reached as to what is possible from the existing resource-base—Japanese manufacturing techniques are good examples here. Whilst this has proven effective in outperforming competitors over the short- to medium-term, the lack of long-term vision and adaptability created its own problems, as the stagnation of the Japanese economy during the 1990s and into the 2000s demonstrates. Evolving competencies and resources on a tactical basis, without some form of long-term direction, can prevent organizations from creating the new competencies required in a changing environment.

The ‘European’ model differs again. It is driven primarily by a focus on implementation—the *ways*—rather than either objectives or available resources. This implies emphasizing, for example, how the organization believes it can best meet its customers needs, how it wishes to reward its stakeholders, employees and trading partners, how it organizes its resources and how it makes strategic decisions. Equally, the way in which senior managers are involved in IS projects will not only influence the business relevance of the investments made but also the benefits actually realized (McGolpin and Ward, 1997). Consistency and predictability in such areas helps the organization to set realizable targets and assess when to develop or obtain additional or different resources. This focus on implementation as a way of reconciling means and ends probably makes this model better suited to today’s environment of rapid and unpredictable change related to either ends or means. As business conditions evolve and new enablers of change emerge, the implementation emphasis on what the organization is able to do, its competencies, and its ability to change means it will have the mechanisms to assess short term options more objectively in the context of its longer term strategy.

IT is a key resource of today’s organizations—a key enabler of change—as are the skills and competencies it has to use the technology. The *ways* an organization chooses how to deploy technology and the associated resources (the *means*) are the strategies, which in turn will determine the results (or *ends*) the organization can achieve. It is suggested that the focus of IS/IT strategic management should first be on the ways the organization can implement IS/IT to improve the conduct of its business using IS/IT and the ways IS/IT can enable it to change—rather than business objectives or the inherent capabilities of IT. For example, customer relationship management (CRM) software is a resource, how an organization decides to deploy the software and change the ways it manages customer relationships will determine what it can actually achieve.

8. From IS capability to organizational performance

The strength or otherwise of an organization’s IS capability is ultimately only determined in the way it impacts business performance. Fig. 5 depicts how the IS capability, with its underpinning IS competencies, fits within an overall model of the organization, its strategy and its performance. This model illustrates the relationship between business strategy, IS/IT strategy, IT operations and services, business operations and organizational performance. It emphasizes that organizational performance ultimately derives from business operations—sales, manufacturing, marketing, logistics, customer

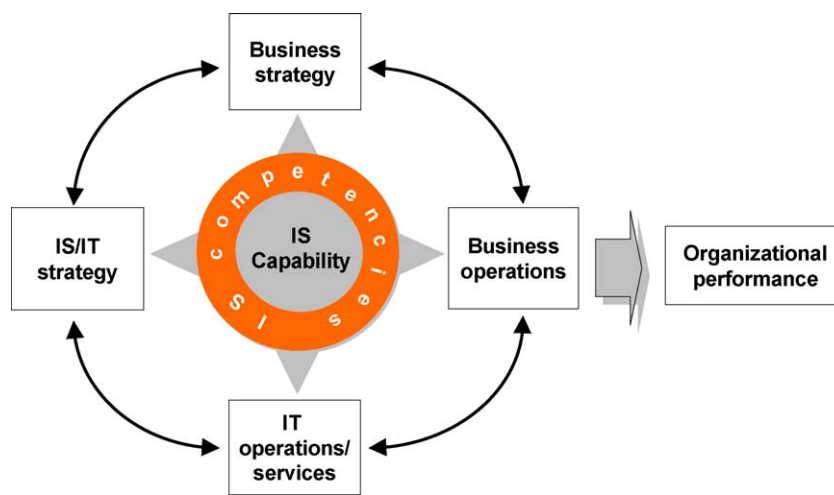


Fig. 5. The new IS/IT alignment: IS capability and organizational performance.

service, research and development, etc.—not directly from IT, even though technology may be a core component without which business operations could not be performed successfully.

The IS capability affects all four areas of the model. The underlying IS competencies will determine the extent to which IT opportunities are incorporated in business strategy, the effectiveness of business operations through systems and technology support, how well the IT infrastructure is designed and resourced, the level of performance achieved by IT operations and the quality of its services, *and* the ability of an organization to deliver specific, measurable business benefits from IS/IT investment and deployment.

A weakness in any area of IS competence directly or indirectly impacts the business operations and ultimately affects business performance. The new IS/IT alignment is concerned with how well the organization develops, nurtures and utilizes its IS competencies in relation to each of the four areas of the model. This view contrasts with the traditional view which considers just the alignment of the business and IS/IT strategies and the structures and processes of the IS function and activities in relation to the business organization. Not that these are no longer important, but addressing the underlying competencies should by definition enable better strategic management and overcome the limitations inherent in any formal structuring of IS resources.

This model enhances the process model of [Soh and Markus \(1995\)](#), which describes how IT creates business value, by surfacing the mechanisms, i.e. competencies, through which this value is actually achieved. Their model, which is an amalgam of a number of previous models, proposes three steps in transforming IS/IT investments into improved organizational performance: the IS/IT conversion process, the IS/IT use process and the competitive process—loosely corresponding to the means, the ways and the ends, respectively. Soh and Markus propose a recipe suggesting the necessary processes and the sequence that leads to success: organizations spend on IS/IT and, subject to varying degrees of effectiveness during the management of IS/IT, obtain IS/IT assets. “Quality

IS/IT assets, if combined with the process of appropriate use, then yield favorable impacts. Favorable IS/IT impacts, if not adversely affected during the competitive process, lead to improved business performance” (p. 39).

There is much IS/IT strategy research that has focused on the first and last parts of the Soh and Markus model, essentially the *means* and *ends*. The middle process connecting IT assets to their impacts, through appropriate use—the ways—is the least well understood, particularly in areas such as defining what constitutes appropriate and beneficial use, and how the use of IT actually affects particular aspects of business performance. These in turn depend on two things: the organizational competencies in using IS/IT and its ability to measure the real outcomes of IS/IT deployment on business performance—this in itself is a competence! There is a plethora of literature about appraising intended IS/IT investments, but there is very little informative research concerning how value is actually unlocked. This is clearly a complex task, but worthy of research—competencies can most easily be improved when the results of having or not having a competence can be objectively assessed.

9. Conclusion

The discussion of this proposed ‘fourth era’, where an organization’s performance will be significantly dependent on its IS capability, recognizes that IS/IT now plays an integral role in organizations. In the previous SIS era, the focus was on developing an IS strategy, which identified the most beneficial set of IS/IT investments to make in order to support business objectives and take advantage of new IT options. This in itself has become more challenging as applications become both more complex and more strategic, demanding innovative thinking about IS/IT use and the ability to make increasing degrees of business change to deliver the benefits. However, there was an assumption that any organization could achieve success by excellence in developing its strategy—excellence in the sense of astute assessment of the impact of IS/IT and accurate alignment of IS/IT investments with business strategies.

The concept of an IS capability suggests that an organization will not be able continually to achieve both of these unless it has a track record of successful implementation, through which it develops a full set of IS competencies. This in turn implies a focus on *the ways* it manages and uses IS/IT, learning explicit lessons from its success and failure, rather than concentrate on what technology can do (*the means*), or try to align IS/IT use to achieve business objectives (*the ends*), which, often arbitrarily, set the investment and change agenda.

In the IS capability era, the strategic management of IS is about developing IS competencies. This is not to say that the key objectives of the SIS era are now obsolete: just as the objectives of the DP and MIS era’s became a subset of the overall SIS objective to improve competitiveness, so too is this objective subsumed into the concept of IS capability; with a strong IS capability, IT opportunities will be incorporated in the business strategy and IS/IT investment thus aligned. In addition, the ability of the organization to exploit these investments through the delivery of business benefits is also explicitly addressed.

Perhaps fueled by the hype that continually surrounds IT, management seem to be still hoping for the ‘silver bullet’—that merely possessing a technology will deliver untold benefits. The recent re-labeling of IS/IT as ‘e’ seemed to re-ignite that inherently flawed notion. The stock market boom in technology stocks and unsubstantiated claims for the ‘new economy’ increased that misplaced confidence for a short time—but long enough for vast sums to be wasted on failed IT investments! This suggests a significant level of incompetence exists.

Taking advantage of all that technology offers requires an enduring ability within an organization to understand how systems and information use can and does improve its performance. This requires sustained investment in developing competencies that, once in place, enable the organization to exploit the technology, systems and information it has and, with the knowledge acquired, make further investments each of which delivers explicit, measurable value through realised organisational performance improvements. Strategic management is about making informed choices based on an understanding of both the relative benefits of different options *and* the organization’s ability to deliver those benefits.

There is still much to learn. Research to examine and understand how IS competencies and capability can be developed and sustained will provide a real source of value to organizations. We hope that this paper provides a starting point for developing that research agenda.

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