International Journal of Information Management 34 (2014) 622–633

Contents lists available at ScienceDirect

International Journal of Information Management

journal homepage: www.elsevier.com/locate/ijinfomgt

The impact of core and infrastructure business activities on information systems planning and effectiveness

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ARTICLE INFO

Article history:
Received 7 June 2013
Received in revised form 9 June 2014
Accepted 9 June 2014
Available online 28 June 2014

Keywords:
Core activities
Infrastructure activities
Information systems planning
Planning effectiveness

ABSTRACT

Core and infrastructure business activities are vital to the organization, and are growing more and more dependent on information systems. Theory suggests that more core and infrastructure business activities would inspire more strategic information systems planning which in turn would result in greater planning effectiveness. One hundred thirty chief information officers in manufacturing companies completed a questionnaire about the extent that their organization performed core and infrastructure business activities, and carried out technical, personnel, and procedures planning. The findings showed that infrastructure activities lead to all three types of planning whereas core activities lead only to procedures planning. Moreover, they showed that technical planning leads to planning effectiveness whereas personnel and procedures planning do not. The findings suggest that future researchers might try to uncover the reasons that core activities do not lead to more information systems planning. For practitioners, the findings suggest that managers reconsider how their organizations respond to core and infrastructure needs, and whether they should adjust their information systems planning.

1. Introduction

Firms today are growing increasingly complex both in the core and infrastructure business activities that they must carry out (Zhang & Gregory, 2011). Competition, government regulation, advances in technologies, and customer and employee expectations are driving this growth in complexity. At the same time, information systems are increasingly called upon to support and simplify core and infrastructure activities (Schmidt & Buxmann, 2011).

Planning those information systems is essential to enabling them to achieve their goals. Organizations must not only perform planning for the information technology itself but also for the personnel responsible for managing, developing, and using the technology as well as the procedures for managing, developing, and using it (Harris, 1989; Segars & Grover, 1999).

Effective strategic information systems planning can help managers choose the new systems that best assist them in accomplishing their business objectives and carrying out their business strategies (Morley, 2004; Reponen, 1994). Ineffective planning can produce new systems that waste scarce resources and fail to support objectives. The problems of wasting resources and failing to support objectives are especially challenging in manufacturing companies where competition can be so intense, and machinery and materials such important cost components. Information systems planning has in fact remained one of the most critical business challenges throughout the world (Luftman, 2005; Luftman & Zadeh, 2011; Teo & Ang, 1999).

Core and infrastructure activities are expensive, complex, and increasingly dependent on information systems. The first purpose of this study is to determine if organizations respond to that complexity with information systems planning. From a practical perspective, results might contribute by enabling organizations to ascertain if they respond appropriately to such activities and if they should respond differently. From a theoretical perspective, results could enhance our understanding of planning behavior in response to the activities within organizations.

The second purpose of the study is to determine if the planning is effective. From a practical perspective, results might contribute by helping the organization decide how it might change its planning. From a theoretical perspective, results could enhance our understanding of how planning actually works.

The paper next defines constructs, presents hypotheses, and explains the research methodology. After testing the hypotheses

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http://dx.doi.org/10.1016/j.ijinfomgt.2014.06.001
0268-4012/

and discussing the results, implications for research and practice are presented.

2. Constructs

Firm activities, strategic information systems planning, and strategic information systems planning effectiveness are the constructs in this study. Firm activities are vital to the organization, and are growing increasingly dependent on information systems. Theory suggests that more core and infrastructure business activities would inspire more strategic information systems planning (Armistead & Clark, 1993; Bergeron, Buteau, & Raymond, 1991; Evans & Smith, 2004; Porter, 1985) which in turn would result in greater planning effectiveness (Chen, Mocker, Preston, & Teubner, 2010; Raghunathan and Raghunathan, 1994; Teo & Ang, 2001).

We define the constructs carefully in the current section before hypothesizing in the subsequent section that the extent of core (H1) and infrastructure (H2) firm activities will affect technical, personnel and procedures information systems planning activities which (H3) will influence strategic information systems planning effectiveness. In summary, the theoretical justification of H1 and H2 will be grounded in Porter's (1985) assertion that information systems strategy be consistent with business strategy.

Technology is embedded in every value activity in a firm thus permeating the value chain (Porter & Millar, 1985). Technology strategy hence "must be consistent with and reinforced by choices in other value activities" (Porter's, 1985, p. 176). Because the value chain might not lie entirely within one organization and some parts of it may be controlled by suppliers or agents and distributors, linkages between the different stages and from infrastructure activities to core activities can be extremely important to facilitate business strategy (Armistead & Clark, 1993; Porter & Millar, 1985). Such linkages can be coordinated, enabled, and exploited by information systems suggesting that there exists an intricate relationship between value chain activities and information systems planning, which can provide the organization competitive advantage (Porter & Millar, 1985).

Likewise in summary, the theoretical foundation of H3 will be grounded in the theory that the process of identifying an organization's intended IT investments (i.e., strategic information systems planning) helps it achieve its business objectives and thus improves its business performance by defining goals and milestones as well as by better predicting, among others, technology changes, human resource requirements, competitor actions, regulations, and customer needs (Chen et al., 2010; Raghunathan & Raghunathan, 1994).

2.1. Firm activities

Firms perform activities to add value to their products and services in order to better accomplish their objectives. Porter (1985) identified nine such fundamental firm activities. Morrison and Roth (1993) modified Porter's list, and added five more for greater breadth.

Some activities directly provide value to a firm whereas others are so generic across firms as to constitute their foundation. The value providing activities are referred to as core activities, and the generic activities are referred to as infrastructure activities (Joseph & Swanson, 1998). Table 1 shows both sets of firm activities. The current study employs the framework in the table.

Table 1
Core and infrastructure activities.

	Activity
Core	Manufacturing operations
	Product distribution
	Customer service
	Product promotion and advertising
	Sales activities
Infrastructure	Raw materials and parts procurement
	Product research and development
	Process research and development
	Accounting/legal activities
	Government and public relations
	Human resource management
	Cash flow management
	Raising and managing capital

2.2. Strategic information systems planning

Strategic information systems planning is the process whereby an organization determines its intended information technology investments that can assist it in achieving its business objectives and thereby enhancing its business performance (Chan, Huff, Barclay, & Copeland, 1997; Chen et al., 2010; Henderson & Venkatraman, 1993; Lederer & Sethi, 1988; Reich & Benbasat, 2000). While planning can help new and established firms respond to emerging opportunities without being forced to improvise in creating or enacting solutions, such planning can also substantially increase the time to develop responses leading firms to lean on other mechanisms such as time pacing instead of formal planning (Brown & Eisenhardt, 1998; Zahra, Sapienza, & Davidsson, 2006).

The organization carries out its strategic information systems planning in response to a business plan identifying those business objectives, and thus creates an information systems plan to carry out the objectives and enhance the organization's competitiveness (Kearns & Lederer, 2003). Business executives participate in IS planning and IS executives take part in business planning. Not only does the business plan influence the IS plan but the IS plan can influence that business plan both through this participation and through the impact of new technology. The knowledge sharing that stems from the participation of the executives can be regarded as a strategic resource, and can also positively affect the use of IT for competitive advantage (Barney, 1991; Grant, 1991).

An organization may follow a well-defined, formal methodology or an informal approach (Bryson & Currie, 1995; Teo, Ang James, & Pavri, 1997). IS planners create or revise their list of intended investments, the priorities of the investments, and the personnel and technology infrastructure to support them. They also provide a schedule for implementation. Top, IS, and other business managers play significant roles in this effort (Teo & Ang, 2001). IS planning is sometimes done with periodic, major efforts or strictly on a continuing basis, or as a combination of periodic and continuing bases.

Information systems are composed of hardware, software, data, telecommunications, people, and procedures (Hartono, Li, Na, & Simpson, 2010; Stair & Reynolds, 2012). Organizations manage those IS components as resources (Detlor, 2010), and do so by planning individual activities (Harris, 1989). The activities can be grouped into technical, personnel, and procedures planning (Mirchandani & Lederer, 2004). The technical resources focus on computer hardware and software, the personnel resources focus on people who create and support information systems, and the procedures resources focus on information system security and reliability. Table 2 shows the groups and individual activities associated with each. This study employs the framework in the table.

2.3. Strategic information systems planning effectiveness

Strategic information systems planning effectiveness has been assessed in terms of the accomplishment of objectives (Raghunathan & Raghunathan, 1994; Segars & Grover, 1999). A