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Influence of IT Architectural Strategy and Business Strategy Alignment on Competitive Advantage: A Proposed Research Framework

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Abstract

Information technology (IT) architecture and its links to competitive strategy is a subject of considerable interest in the literature. This study offers a comprehensive framework that integrates IT architectural strategy with business strategy in pursuit of competitive advantage (CA). This paper suggests that IT architecture should be aligned with business strategy in order to achieve CA, and that IS planning plays a critical role in facilitating this alignment.

Introduction

IS strategy and planning have received considerable attention from researchers and practitioners over the past decades due to the increasingly strategic nature of information systems [Earl 1989, Ives & Learmonth 1984, Wiseman 1985, Neuman 1994]. Generally, however, one of the key components, namely, IT architecture and its relationship to business strategy has not received much attention. While prior research has emphasized strategic alignment between information systems and organizational strategies [Tavakolian 1989, Das et al. 1991, Brown & Magill 1994], few studies have investigated how such a strategic fit is enabled, and how IS strategy varies depending on organizational strategy.

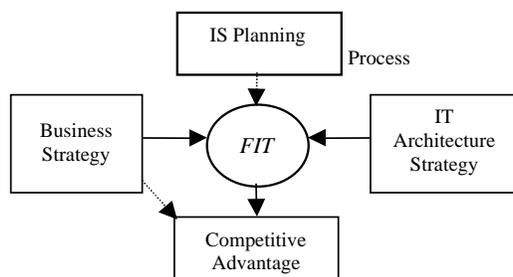
This paper presents how IT architecture strategy relates to business strategy in order to produce competitive advantage and how IS planning can help achieve the strategic fit. The results of such a study could help organizations formulate and execute IT architecture efforts, and make better decisions about the allocation of IS resources.

Theory and Conceptual Framework

This study and its model are based on contingency theory. The concept of “fit” is a central part of contingency perspective in IS strategy research. A number of researchers emphasizing strategic fit assert that an organization should design its information systems to conform with its overall organizational context variables, such as organizational strategy and structure to avoid conflict [Cash et al. 1988, McFarlan & Mckenney 1982, Camillus & Lederer 1985, Tavakolian 1989, Das et al. 1991, Brown & Magill 1994, Camillus & Lederer 1985, Tavakolian 1989].

This paper attempts to explain how competitive strategy, IT architecture, IS planning, and competitive advantage are related. The figure below displays a conceptual research model linking these four key constructs.

The model suggests that achieving fit between IT architecture strategy and competitive strategy would create synergy through better coordination of different functions, leading to CA. Competitive strategy alone might have a direct effect on CA. Even if this exists, our model proposes that the ‘fit’ between competitive strategy and IT architecture will have a bigger and more significant impact on CA.



The model also proposes that effective IS planning would help achieve the fit between IS strategy and organizational strategy. King [1978] noted that the primary role of IS planning is to link organizational strategy to IS strategy. Earl [1993, p.1] contends that "IS planning should target aligning IS-investment with business goals, exploiting IT for CA, directing efficient and effective management of IS resources, and developing technology policies and architectures". Our study suggests that IS planning facilitates alignment of IT architecture with business strategy to create CA.

IT Architecture Strategy Design

IT architecture has been considered in terms of four major categories: hardware, software, data, and management (people, organization, and procedure). Table 1 offers a brief definition of these dimensions, with supporting literature. Overall, IT architecture strategy has been proposed to have four key interrelated dimensions (encompassing 20 primary components) as shown in Table 1.

Table 1. Dimensions and Components of IT Architectural strategy: Definitions and Literature Support

<i>Dimensions</i>	<i>Definitions and Components</i>	<i>Illustrative Citations</i>
Hardware	Physical and tangible information technology used by the firm in its information systems. <u>Key components</u> : H/W compatibility; integration; type; and structure.	Camillus & Lederer [1985] Lederer & Sethi [1991] Earl [1989] Leifer [1988]
Software	Intangible information technology used by the firm in its information systems. <u>Key components</u> : system development; package use; IS group contribution; end-user computing.	Earl [1989] Brown & Magill [1994] Kraushaar & Shirland [1985]
Data	The data assets of the firm and the requirement of use, access, control and storage. <u>Key components</u> : extent of data sharing; centralization of data; data integration; & database utilization.	Lederer & Sethi [1991] Earl [1989] Goodhue et al. [1992] Beehler [1976]
Management:		
People/	Persons and their organization that provide information systems service.	Lederer & Sethi [1991] Earl [1989]
Organization	<u>Key components</u> : organization basis; focus; promotion basis; and organizational structure.	Leifer [1988] Tavakolian [1989]
Procedures	Administration mechanism, managerial actions, and operation rules to manage entire IS-related activities of the firm. <u>Key components</u> : standardization; formality; administration philosophy; and policy flexibility.	Lederer & Sethi [1991] Earl [1989] Zmud & Cox [1979] Camillus & Lederer [1985]

Organizational Strategy

In discussing “fit” between IS strategy and business strategy, the Miles-Snow [1978] typology can be useful. Its efficacy for relating IS dimensions with organizational strategy has been examined by a number of researchers [Camillus and Lederer 1985, Tavakolian 1989, Das et al. 1991, Gupta et al. 1997]. **Miles-Snow** typology is basically behavioral-oriented and identifies four organizational strategic types based on the pattern of a firm’s adaptive process: defenders, prospectors, analyzers, and reactors. This typology is parsimonious, but seems to explain significant variation across organizations.

IS Planning

This study draws from Das et al.’s (1991) work. They proposed how IS planning can vary by Miles-Snow typology of strategic types. They proposed four major “content” dimensions (distinctive competence, information systems (IS) technology, system design and development, MIS infrastructure) and five “process” dimensions (formality, scope, participation, influence, and coordination). They argue that strategic IS planning has to aim to ensure consistency and integration among the four content dimensions and the five process dimensions to ensure CA and that choices along the dimensions should fit the firm’s competitive strategy.

Research Propositions

First, the conceptual framework of this study indicates that IT architecture should be related to organizational strategy and that this relationship leads to CA. Therefore, the first proposition of this study is the following.

Proposition 1: Fit between competitive strategy and IT architecture is positively associated with competitive advantage.

An IT architecture that does not support/ accommodate the goals and mandates of competitive strategy will not be able to yield CA. A consistency of choices between the IT architectural dimensions and organizational strategy is required. Posited relationships between competitive strategies and each IT architectural dimension are presented in Table 2.

Defenders are supposed to seek out efficiency from their overall IT, while prospectors are expected to be effectiveness-oriented in their IT strategy, in order to have CA.

Defenders typically exhibit a distinctive competence based on low cost [Miles & Snow 1978]. They can be expected to use highly compatible, integrated and centralized hardware systems and mainframe-based information systems. Also, they may favor systems that are developed internally due to low-cost orientation and limited range of their products and markets. The contribution of the IS department will be relatively high. Thus, they may exhibit low package-use and end-user computing. Defenders are expected to emphasize extensive integration of their databases and exhibit high data sharing, centralization and utilization to support their narrow operational activities, and formal authority and coherence in their business activities. Their IS organization may be designed as a functional-form to emphasize technical skill, favor internal promotion, and to have centralized IS organization structure. IS rules and procedures are likely to be more standardized and formalized to achieve coherence in IS efforts. They may also exhibit hierarchical administration systems and low level of policy flexibility.

Table 2. Linking IT Architecture Dimensions and Planning Process with Miles-Snow Strategic Types

IT Architecture Dimensions	<i>Defender</i>	<i>Analyzer</i>	<i>Prospector</i>
Hardware			
Compatibility	H	M	L
Integration	H	M	L
Type	Mainframe-oriented	Hybrid	Micro/Mini oriented
H/W Structure	Centralized	Distributed	Decentralized
Software			
System Development	Insourcing-oriented	Mixed	Outsourcing-oriented
Package Use	L	M	H
IS group contribution	H	M	L
End-User Computing	L	M	H
Data			
Data sharing	H	M	L
Data centralization	H	M	L
Data integration	H	M	L
Database Utilization	H	M	L
People/Organization			
Organized by	Function	Hybrid	Product-type
Focus	Technical skill	Mixed	Interpersonal skill
Internal promotion	H	M	L
Organization structure	Centralization	Hybrid	Decentralization
Procedures			
Standardization	H	M	L
Formality	H	M	L
Admin. Philosophy	Hierarchical	Hybrid	Individualistic
Policy Flexibility	L	M	H
* IS Planning Process			
Formality			
Level	Highly Formal	Moderate	Informal, Flexible
Type	Top-Down	Top-Down	Bottom-Up
Scope			
Breadth of activities	Narrow	In Between	Broad
Participation	High	High	High
Influence	High	Medium	Low
Coordination			
Means of coordination	Formal (Primarily)	Formal & Informal	Formal & Informal

H: High; M: Moderate; L: Low

(* IS Planning Process Dimensions adapted from Das, Zahra, and Warkentin, 1991)

On the other hand, *prospectors* are expected to stress uniqueness and innovation in handling the information needs of varied and dynamic markets to go along with their distinctive competence in product differentiation and uniqueness [Das et al. 1991]. Therefore, their systems are expected to be decentralized and mainly consist of micro or mini computers that are often incompatible and less integrated. Also their IS function may focus on external sources in system development, use software packages more than defenders, and exhibit high levels of end-user computing. Extensive involvement of many functional areas in system design is expected and thus interpersonal skills are important to IS people. Due to diversity of products and markets, they may exhibit low levels of data sharing, centralization, integration and utilization. Their primary capability is to find and exploit new product/market opportunities constantly [Miles & Snow 1978]. Thus, they are likely to exhibit a lower degree of integration in their systems and to have product-based IS structures. Given an unstable domain, they try to pursue flexibility rather than efficiency. Therefore, they are expected to exhibit less standardized and formalized IS procedures, and more policy flexibility.

Analyzers represent an intermediate position between defenders and prospectors. They are expected to make choices typical of defenders in their traditional and stable lines of business, but adopt a strategy of prospectors in their newer and dynamic business [Miles & Snow 1978]. Thus, their information systems exhibit middle position between these two extremes.

Proposition 2: IS planning process of an organization enables the achievement of alignment between IT architecture and competitive strategy.

IS planning features based on Miles-Snow strategic types are described in Das et al (1991)'s conceptual paper. Building on their work, but taking a different view, we argue that IS planning is an enabler of strategic alignment between IT architecture

and organizational strategy. Due to lack of space, we can only present one example to explain IS planning's facilitative role. Earlier we proposed that Defenders would look to high hardware compatibility and integration, and that they tend to have a mainframe-oriented computer environment and a centralized structure. A top-down, formalized IS planning process with a narrow scope of IS activities and emphasis on coordination and integration can facilitate an alignment between IT and business strategy of Defenders.

Conclusion

This study proposed a conceptual, integrative model which argues that the fit between IT architectural strategy and business strategy would be related to competitive advantage and that this fit is enabled by IS planning. The framework may enhance the managers' understanding of what component of IT architecture to focus on and how to carry out an effective IS planning process to achieve the fit. Measurement instruments are under development to empirically validate the model.

References

References available on request from authors (rmurthy@csd.uwm.edu).