

STUDY ON RELATIONSHIP BETWEEN IT FLEXIBILITY, IT-BUSINESS STRATEGY ALIGNMENT AND IT CAPABILITIES

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Abstract

IT infrastructure flexibility is now being viewed as an organizational core competency that is necessary for organizations to survive and prosper in rapidly-changing, competitive, business environments. Utilizing data from InfoTech Department of Lovely Professional University, this study examines the impact of the four components of IT infrastructure flexibility (compatibility, connectivity, modularity, and IT personnel) on strategic IT-business alignment and the extent of applications implementation within an organization. The findings from analysis of a structural model provide evidence that connectivity, modularity, and IT personnel have significant, positive impacts on strategic alignment and that all four components have significant, positive impacts on the extent of applications implementation. The study reinforces the importance of IT infrastructure flexibility to organizations as one source for sustainable competitive advantage.

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INTRODUCTION

In order to make it easier for organizations to plan and manage themselves well in today's world, leaders of organizations are spending more capital and time on working towards implementing and building information systems. Organizations are able to make the most of the positive effects of their spending on IT in order to attain a good connectivity between the business and IT by aligning their business strategies with information technology. After aligning business strategies with information technology strategies, organizations experience increased competitive gain, progress and returns on investment. IT flexibility was recognized as a primary contributor to IT effectiveness as a means for corporations to compete in a marketplace of increasing demand and cost.

IT in business setups has undergone dramatic switches in the last few decades. All over the world, business environments have seen drastic changes as a result of the late 1990s developments in information technology. The bulk of industrial, commercial and government entities are now more dependant on their IT systems. Globalization and the need for information systems that can cater for wider global businesses, there is tremendous demand to align business strategies with IT strategies. The constantly changing business requirements and the rapidly advancing technological environment have become the force of the on-going challenge in attaining alignment.

As we discuss next in developing the theoretical framework for our study, two important aspects of IT infrastructure flexibility emerge from previous research: the core business applications of an organization and the strategic IT-business alignment. That is, an organization's IT infrastructure flexibility should be reflected in its implementation of core business applications and the extent of its strategic IT-business alignment. Therefore, the purpose of this study is to empirically examine the relationship between IT infrastructure flexibility and the extent of applications implementation in the organization and the relationship between IT infrastructure flexibility and strategic IT-business alignment.

THEORETICAL FRAMEWORK

We develop our theoretical framework by first reviewing definitions of IT infrastructure and its components. We then define the concept of IT infrastructure flexibility and its relationship to strategic IT-business alignment and to applications implementation in the organization.

Information Technology Infrastructure

The topic of IT infrastructure has been a key issue for both researchers and practicing managers for some time. The organization's IT infrastructure basically integrates technology components to support business needs but the IT infrastructure concept is more complicated. The definition of IT infrastructure encompasses a variety of components. Based on previous studies, IT infrastructure includes a group of shared, tangible IT resources that provide a foundation to enable present and future business these resources include:

- (1) Computer hardware and software (e.g., operating systems);
- (2) Network and telecommunications technologies;
- (3) Key data;
- (4) Core data-processing applications;
- (5) Shared IT services.

IT infrastructure includes the alignment of IT plans to business objectives, the IT architecture, and the skills of IT personnel. IT infrastructure capabilities enable the various types of IT applications required to support current and future business objectives, and enable the competitive positioning of business initiatives. As can be seen from these definitions, the IT infrastructure is composed of two components: a technical IT infrastructure and a human IT infrastructure. The technical infrastructure consists of the applications, data, and technology. The human IT infrastructure consists of the knowledge and capabilities required to manage organizational IT resources suggested that a robust IT infrastructure enables employees to be able to perform their respective jobs, both from having the available technology and the necessary technological skills.

Information Technology Flexibility

IT infrastructure flexibility described the concept without actually defining it. IT infrastructure should be flexible to be able to handle increased customer demands without increased costs. IT flexibility should be viewed as a core competency of the organization and suggested that an effective IT infrastructure is flexible and robust.

One organization's IT infrastructure may enable strategic innovations in business processes, while another's IT infrastructure may limit such innovations. IT flexibility suggested that both business and IT application development capabilities reflect the flexibility of infrastructure components. IT flexibility improves systems developers' ability to design and build systems to meet organizational business objectives.

Organization IT become flexibility through the characteristics of connectivity, compatibility, and modularity. An organization with high modularity, compatibility, and connectivity would have high technical IT infrastructure flexibility.

Compatibility is the ability to share any type of information across any technology component throughout the organization. IT compatibility helps span organizational boundaries, empower employees, and make data, information, and knowledge readily available in the organization.

Connectivity is the ability of any technology component to communicate with any of the other components inside and outside of the organizational environment. IT connectivity enables seamless and transparent organizations that are independent of time and space. Connectivity facilitates the sharability of IT resources at the platform level.

Modularity is the ability to easily reconfigure (add, modify, or remove) technology components. Modularity is the standardization of business processes for sharability and reusability. Modularity is a continuum describing the degree to which a system's components can be separated and recombined.

CONCEPTUAL MODEL

IT Infrastructure Flexibility and Strategic IT-Business Alignment

Strategic IT-business alignment refers to the extent to which the IT mission, objectives, and plans support, and are supported by, the organization's mission, objectives, and plans. This alignment creates an integrated organization in which every function, unit, and person are focused on the organization's competitiveness. IT management is a problem of aligning the relationship between the business and the IT infrastructure to take advantage of IT opportunities and capabilities.

The alignment of IT plans to business objectives in her description of IT infrastructure. She continued by noting that an organization's IT infrastructure could be considered flexible if it enabled strategic innovations in business processes. Broadbent and Weill [1997] stated that IT infrastructure capabilities provide the foundation for "...competitive positioning of business initiatives."

From this discussion, we propose the following hypothesis:

Hypothesis 1: Each component of an organization's IT infrastructure flexibility will positively affect the organization's strategic IT-business alignment.

IT Infrastructure Flexibility and Applications Implementation

Today, IT applications not only process data and provide management information reports. Corporations now use IT applications to gain competitive advantage [Earl, 1989; Porter & Millar, 1985; Powell, 1992; Saunders & Jones, 1992; Smith & McKeen, 1993]; to create new business opportunities [Earl, 1989; Rockart & Scott-Morton, 1984; Smith & McKeen, 1993]; to

improve customer service; to enhance product and service quality; and to integrate supplier and customer operations [Luftman, Lewis, & Oldach, 1993].

Several studies have included business applications as part of IT infrastructure [see e.g., Broadbent & Weill, 1997; Byrd & Turner, 2000; Duncan, 1995]. Duncan [1995] addressed business applications when she asserted that IT infrastructure flexibility enabled organizations to build applications that more closely satisfy business objectives. Broadbent and Weill [1997] stated that IT infrastructure capabilities are the “base for computer applications.” Byrd and Turner [2000] noted that IT infrastructure flexibility enabled organizations to “...easily diffuse and support...core applications.”

For this study, we use the extent to which organizations have implemented a variety of business applications to examine the concept of “applications implementation.” These eleven business applications in our study include transaction processing systems, management information systems, executive information systems, decision support systems, expert systems, data warehousing, data mining, Interorganizational information systems (e.g., electronic data interchange), knowledge management, network management, and disaster recovery.

From this discussion, we propose the following hypothesis:

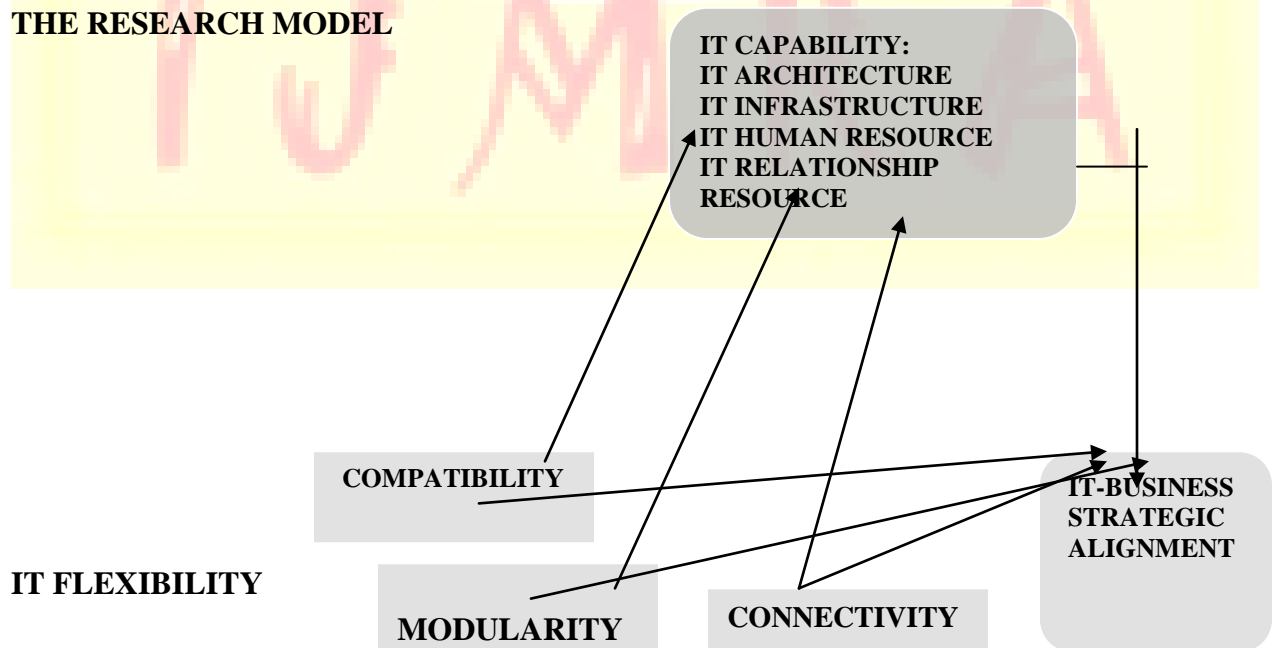
Hypothesis 2: Each component of an organization's IT infrastructure flexibility will positively affect the organization's extent of applications implementation.

Research Model

Based upon the studies and researches, it can be concluded that strategic alignment is affected by many factors. To name a few factors, communication between IT and business, shared knowledge between IT and business, IT-managerial resources, flexibility of IT, environmental ambiguity, size of organization, the relationship between IT planning and business, design or planning of strategic information can influence strategic alignment. For this study, we have focused on IT flexibility due to some reasons that we have mentioned previously. We have categorized modularity, connectivity and compatibility as components of IT flexibility. We are going to examine all the mentioned components against other constructs. Additionally, we have found a gap after examining and reviewing the literature on this subject. In order to fill in the gap, we have included IT capability construct in relation to strategic alignment and IT flexibility.

This study utilizes four previously identified measures of IT infrastructure flexibility: the technical components of modularity, compatibility, connectivity, and IT personnel skills. The conceptual model representing the relationships addressed in this study is presented in Figure 1.

THE RESEARCH MODEL



OBJECTIVES OF THE STUDY

In this Research Study first the current IT processes are studied, we are finding out the IT infrastructure available with the organization and also finding out the whether LPU is financially sound. After studying the current Information Technology processes being used in the organization we will find out the perception of employees towards use of IT in the organization, we will also find out the Technical Feasibility, Financial Feasibility of IT Strategic operations in Lovely Professional University.

- Study the influence of IT flexibility on strategic alignment.
- Study the impact of IT-Business strategic alignment on Firm's performance.
- Study How IT Capabilities contribute to a company's competitive advantage.

RESEARCH METHODOLOGY

In this study we take the Info-Tech department of (Lovely Professional University) for the purpose of getting information of “the relationship between the IT flexibility, IT Business strategy alignment, IT capability.” Both primary and secondary research will be performed. Primary research will be done by surveys or questionnaires. Secondary research will be performed by reading previous research papers and articles.

Research Design:

Research Design is an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy on procedure. The research problem having been formulated in clear-cut term helps the researcher to prepare a research design. In this research descriptive study is used.

Sampling Design:

The following factors have to decide within the scope of sample design.

Sampling Technique:

For the purpose of research, convenience sampling is used for collection of primary data from the InfoTech employees. Convenience sampling is a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher.

Sample Size:

The sample size is 44, in the research study.

Sampling Frame:

The sample frame for this research constitutes all the employees of IT department and of Lovely Professional University.

Data Collection

The study used proportionate stratified random sampling to select the sample. Proportionate stratified random sampling ensures that every population segment is proportionately represented, thus preventing the selection of extreme samples. Responses were received from 44 InfoTech employees.

DATA ANALYSIS AND RESULTS

We assessed unidimensionality using the factor loadings of items of their respective constructs. All loadings (except transaction processing systems and network management) were above 0.55, as suggested by Falk and Miller [1992]. These loadings confirmed that 26 (out of 28) items loaded satisfactorily on their constructs. Although the loadings for transaction processing

systems and network management were below 0.55, they were significant ($p < .001$), and were retained for data analysis.

All path coefficients are significant, except the one between compatibility and strategic alignment. The R-squared value for the strategic alignment construct is .356, meaning that the IT infrastructure flexibility constructs account for 35.6 percent of the variance in alignment. Similarly, the R-squared value for the extent of applications implementation construct is .217, meaning that the IT infrastructure flexibility constructs account for 21.7 percent of the variance in the extent of applications implementation.

Hypothesis 1, relating each dimension of IT infrastructure flexibility and strategic IT-business alignment, was supported for modularity, connectivity, and IT personnel, but not for compatibility. Hypothesis 2, relating each dimension of IT infrastructure flexibility and the extent of applications implementation, was supported for all four dimensions.

DISCUSSION

Three components of IT infrastructure flexibility (connectivity, modularity, and IT personnel) have significant, positive impacts on strategic IT-business alignment. That is, these three components facilitate strategic alignment. A major characteristic of modern business environments is rapidly changing conditions. Therefore, organizations themselves must be adaptable in order to effectively respond to these conditions.

For IT infrastructures to be able to facilitate organizational responses to dynamic environments, the IT strategy must be tightly aligned with the organizational strategy. This close alignment means that IT infrastructures must be flexible as well.

Connectivity means that every person, every functional area, and every application in the organization are linked to each other. As a result, communications throughout the organization are enhanced, and users can rapidly share information across organizational boundaries. This sharing enables rapid response to necessary changes in the firm's strategy, thus increasing strategic alignment.

Modularity is the ability to quickly build or modify business applications needed to meet new business conditions. For example, modularized middleware provides interoperability

among various applications (particularly between legacy applications and newer applications) across an enterprise. A high degree of modularity means greater speed in developing new applications or modifying existing applications. As with connectivity, this speed will enable rapid response to changes in organizational strategy, thus increasing strategic alignment.

IT personnel have skills working cooperatively in cross-functional teams using many technologies. Consequently, they facilitate boundary spanning and help the organization react to changes in its environment. In addition, IT personnel provide the necessary connectivity and modularity that enable rapid organizational response to changes. They also may be members of strategy teams whose mission it is to formulate IT strategy in accordance with organizational strategy. In these ways, IT personnel contribute to strategic alignment.

An interesting finding was that compatibility did not have a significant impact on strategic IT-business alignment. Compatibility is the ability to share any type of data or information across an organization or between organizations along the supply chain. The items comprising the compatibility construct refer to technical aspects of IT, and respondents may have considered this construct as more technical and not particularly related to the business context of strategic alignment.

All four components of IT infrastructure flexibility have significant, positive impacts on the extent of applications implementation in an organization. The first component is compatibility.

Open systems such as PC-based plug-and-play platforms, Common Object Request Broker Architecture (CORBA), Web Services (e.g., Microsoft .NET), and Extensible Markup Language (XML) have been introduced to enhance the compatibility of differing applications and platforms. Firms may benefit from a number of open systems components when new applications are implemented. Chau and Tam [1997] stated that open systems represent an approach to implement a suite of interface standards between software/hardware and communications systems for compatibility purposes. Therefore, compatibility facilitates the extent of applications implementation.

The concept of connecting all users, functional areas, and applications within and across organizations to enable seamless sharing of information impacts the extent of applications implementation. The information shared by users is provided by the organization's various applications and these applications are much less valuable (as we have observed historically) if

they are constructed and used as “silos.” Therefore, our findings suggest that connectivity plays a role in the extent of applications implementation.

Modularity gives organizations the ability to quickly build new applications and modify existing applications more quickly and easily than ever before. Modularity is based on the concept that software applications are more manageable when required routines are processed in separate modules. For example, modularized middleware can be used to achieve interoperability between different components or applications. Enterprise Java Beans can provide reusable modules to manage interfaces among applications.

Highly-skilled IT personnel are the essential ingredient of applications implementation. These professionals have knowledge of the firm’s set of IT resources and of other technologies in the firm’s external environment [Duncan, 1995]. IT professionals’ also have knowledge of the firm’s business processes to be able to facilitate business strategies with new and existing applications.

CONCLUSION

IT infrastructure is fundamental for all business functions and business processes within the organization. The organization's IT infrastructure primarily deals with the integration of technology components to support business needs. The organization's competitiveness depends on the flexibility of the IT infrastructure, because the infrastructure allows the company to quickly develop new processes and applications. The speed with which an organization can implement those processes and applications improves its competitiveness in the market.

The results of our study show that the components of IT infrastructure flexibility impact strategic IT-business alignment and the extent of applications implementation in the organization. That is, IT infrastructure flexibility enables an organization to more closely link its IT strategy to the organization’s strategy. This alignment is critical because it allows an organization to respond more quickly to dynamic business environments. IT infrastructure flexibility also enables an organization to more quickly and easily develop new applications and modify existing applications. Again, such rapid development and modification helps the organization react to changing business conditions. The findings of our study, therefore, suggest that a flexible IT infrastructure is a key to an organization’s sustainable competitive advantage.

Our study has one notable limitation. We use single-source data for each organization, where multiple sources of data (e.g., match responses to the survey from each firm) would be preferable. However, we feel that our respondents have the experience and position in their companies to address the strategic questions in our survey.

An interesting direction for future research would be to examine the recursive relationship between alignment and the extent of applications implementation and IT infrastructure flexibility; i.e., to examine the impact that alignment and the extent of applications implementation have on the four components of IT infrastructure flexibility. Another direction for further study would be to examine the impact of IT infrastructure flexibility on the extent of implementation of other IT initiatives, such as enterprise resource planning systems, business-to-business and business-to-consumer electronic commerce systems, sales force automation systems, and customer relationship management systems.

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