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DETERMINANTS OF INFORMATION TECHNOLOGY OUTSOURCING: A CROSS-SECTIONAL ANALYSIS

Lawrence Loh
and
N. Venkatraman

Working Paper No. 3382-92BPS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
50 MEMORIAL DRIVE
CAMBRIDGE, MASSACHUSETTS 02139

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Lawrence Loh
Massachusetts Institute of Technology
and
National University of Singapore

N. Venkatraman
Massachusetts Institute of Technology

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Authors are listed alphabetically. Please address all correspondence to Professor N. Venkatraman at Sloan School of Management, Massachusetts Institute of Technology, 50 Memorial Drive E52-537, Cambridge, MA 02139; Phone: (617) 253-5044; Bitnet: NVENKATR @ SLOAN. This project was supported by the research consortium on Managing Information Technology in the Next Era (MITNE) of the Center for Information Systems Research (CISR) at the Massachusetts Institute of Technology. We thank John Rockart, Judith Quillard, three journal reviewers, and the editor for comments on earlier versions of the paper.

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Abstract

This paper develops and tests a model of the determinants of information technology (IT) outsourcing by integrating both business and IT perspectives. Specifically, we attempt to explain the degree of IT outsourcing using business and IT competences as represented by their cost structures and economic performances. Additionally, we posit that outsourcing is dependent on business governance, particularly financial leverage. Based on factor analyses and multiple regressions using data from 55 major U.S. corporations, we observed that the degree of IT outsourcing is positively related to both business and IT cost structures. We also established that the degree of IT outsourcing is negatively related to IT performance. Finally, we conclude with implications and future research directions.

Keywords: Information technology outsourcing; information technology strategy.


Introduction

It is a truism that information technology (IT) has transcended its established administrative support function and has moved toward playing a more central role of business operations (see for instance, [14, 18, 25, 35]). Within this tradition, research efforts have focused on the use of IT to influence the boundaries of a firm with its suppliers, buyers and other intermediaries [6, 8, 21]. There is, however, a glaring lack of research emphasis on the role of IT infrastructure as a component of the firm boundary itself. In other words, while IT has been considered a critical mechanism of multi-organizational business relationships, the research stream has treated the governance of IT infrastructure to be within one single firm’s hierarchy. Such an approach fails to recognize the recent trend towards managing a firm’s IT infrastructure through a variety of governance mechanisms with other firms.

Under contractual arrangements popularly termed as ‘outsourcing,’ firms are increasingly shifting specific components of their IT infrastructure away from a ‘hierarchical’ mode toward a ‘market’ mode of governance. The well-publicized decision by Eastman Kodak to hand over its entire data center to IBM, its microcomputer operations to Businessland, and its telecommunications and data networks to Digital Equipment Corporation and IBM is a classic illustration [43, 45]. Beside this particular case, it appears that IT outsourcing is becoming a serious strategic option for many firms. The Yankee Group estimated that all Fortune 500 firms would evaluate outsourcing, and a fifth of them would sign outsourcing deals during the 1990s and that the outsourcing market would increase from $29 billion in 1990 to $49.5 billion in 1994 [7].

IT outsourcing can be dependent on several factors across multiple levels. At the level of the economy, the temporal effects of trends and cycles may motivate firms to rationalize the management of the IT infrastructure through arrangements like outsourcing. At an industry level, competitive pressures may induce firms to
establish 'partnership-based' relationships with key IT vendors. At the firm level, the quest for competitive advantage may serve as a critical impetus to the IT outsourcing decision. Within the firm, the decision to outsource may be dependent on several managerial factors. For instance, managers may like to build empires by accumulating control over corporate resources [27] such as the IT infrastructure. Further, the association of information with power [17] may inhibit the outsourcing decision.

The practice of IT outsourcing has been extensively documented in the business periodicals, but there is scant attention provided to articulate its determinants. In other words, we know the phenomenon in some detail but we do not fully grasp the set of factors leading to the outsourcing decision. Our objective in this paper is to develop a research model on the determinants of IT outsourcing. We recognize the complex array of factors discussed above; but as a first attempt at establishing an empirical model, we focus on factors at the firm-level with appropriate controls for industry sector effects.

**Frameworks of IT Outsourcing**

Outsourcing can be framed as a 'make-versus-buy' decision facing a firm. In its generic form, it has been studied in several settings such as: the manufacturing of parts in the automobile industry [30, 40]; the sales function in the electronic industry [1]; the procurement of components or services in the naval shipbuilding industry [23], and the distribution of equipment, components, and supplies across a broad set of industrial firms [16].

Within the IT profession, the term "outsourcing" is often viewed as a buzzword that is confusing and often misunderstood [44]. We define IT outsourcing as the significant contribution by external vendors in the physical and/or human resources associated with the entire or specific components of the IT infrastructure.
in the user organization. This definition is consistent with the conceptualization of the IT infrastructure in terms of "the internal organization of people and resources devoted to computer-based systems... [involving]... both the tangible equipment, staff and applications and the intangible organization, methods and policies by which the organization maintains its ability to provide system services" [22, p. 148].

In the context of IT sourcing, vendors may contribute computer assets for the user. Alternatively, the ownership of certain computer assets of the user may be transferred to the vendor. Similarly, vendors may utilize their personnel to provide the required services, or existing staff of the user may be employed by the vendor. In Figure 1, we depict the distinction between outsourcing and insourcing based on the two dimensions central to our definition: (1) the degree of internalization of physical resources by the user; (2) the degree of internalization of human resources by the user. By internalization, we mean the ownership of the computer assets or the employment of the system personnel. Several modes of the IT infrastructure have been commonly outsourced by firms. These include applications development, data center, systems integration, systems design/planning, telecommunications/network, and timesharing. The modes of IT outsourcing vary through the different levels of contribution of physical and human resources by the user and the vendor. In Figure 1, we also illustrate the typical location of each mode of outsourcing in the definitional framework.

Insert Figure 1 here

The various modes of IT outsourcing also differ in the domain of influence within the corporation. Domain of influence refers to the extent in which IT is inherent in the business processes as well as the administrative and functional coordination of the organization. For instance, an application development
outsourcing arrangement ordinarily affects a specific domain of the firm, while a telecommunications/network outsourcing arrangement may affect a more general domain of the firm. Further, an outsourcing arrangement differs in terms of the contractual mode (i.e., the type of relationship between the user and the vendor as governed by the agreement). For example, a systems design/planning outsourcing contract may be project-based, while a data center operations outsourcing contract may be period-based. In Figure 2, we show the characteristics framework and illustrate the various modes of IT outsourcing along the two above dimensions.

Insert Figure 2 here

The Research Model

In this paper, we develop a model of the determinants of IT outsourcing, with a particular emphasis on economic constructs from both the business and the IT contexts. Our framework is based on an argument that management should constantly reassess the scope of those activities that should be carried out with a firm’s hierarchy and those that are best performed by external partners including IT vendors. The guiding considerations for such make-versus-buy decisions include: relative cost advantage, economies of scale and scope. Thus, it is likely that in some cases, an IT vendor may be a more appropriate entity to manage the firm’s IT infrastructure than the firm itself. This is because an outsourcing vendor -- being a specialist -- serves multiple users simultaneously. To the extent that the knowledge, skills, and capacity can be pooled across different customers, there can be benefits of economies of scale, which are otherwise absent when single users perform the same tasks. In addition, the wide variety of IT projects undertaken by the vendors permits the reaping of economies of scope. The lower costs attributable to the vendor also arise from the enhanced IT competence and experience, both of which are absolutely
crucial in managing the IT infrastructure in the complex and rapidly changing information era.

We follow Henderson and Venkatraman's [12] model of aligning business and IT domains to derive the specific constructs of the research model. Thus business and IT strategies are viewed as involving the dimensions of competence and governance. Thus, we posit that IT governance (specifically, outsourcing) is dependent on the structural characteristics of the user organization, especially business competence, business governance, and IT competence. We elaborate our rationale below.

**Business Competence**

**Business Cost Structure.** A well-accepted axiom in the strategy and economics literature is that a firm's business cost structure (the entire spectrum of costs directly associated with the actual production and coordination of the firm's product line) is a significant source of business competence given its role in explaining business profitability (see for instance, [5, 32]). Thus, firms try to produce their output below the average cost and are constantly under pressure in a competitive marketplace to reduce the relative cost of business operations. Given the ubiquitous nature of IT that pervades the entire process of transforming inputs into outputs [33], the costs associated with a particular IT governance include the direct technology cost and the indirect cost of supporting the administration of the enterprise. Thus, a firm in a situation of high relative cost will seriously consider the available options to reduce its business cost structure including reassessing the positioning of its IT infrastructure within the scope of the firm's hierarchy.

Therefore we hypothesize that a firm's business cost structure is a crucial determinant of IT outsourcing:

**Hypothesis 1:** The firm's business cost structure will be positively related to the degree of IT outsourcing.
**Business Performance.** Another component of business competence is reflected by the level of business performance. As noted in a trade periodical: "Reduced profits...are causing management to look everywhere to increase margins" [9, p. 89]. Under conditions of poor business performance, firms often seek to streamline their operations, including selling-off or redeploying assets [10]. The traditional view of IT operations as an investment center or a service center is rapidly giving way to an emergent notion of a profit center. Thus, the IT infrastructure is no longer off-limits to the top management team seeking superior performance. In fact, "much of what is fanning the fire for...outsourcing is that business is having to restructure to remain competitive" [9, p. 90]. When the firm does not perform well vis-a-vis its competition, the need to re-evaluate the traditional governance modes of all its major spheres of operations, including the IT arena becomes even greater. We thus seek to test:

**Hypothesis 2:** The firm’s business performance will be negatively related to the degree of IT outsourcing.

**Business Governance**

**Financial Leverage.** The need to reduce reliance on debt financing has been one of the key impetus to outsource the IT infrastructure. Indeed, as widely cited amongst practitioners, increased debt "has been a major reason for cutting costs in the IS area, thus supporting the use of outsourcing...." [9, p. 90]. Within the context of an imperfect corporate financing environment (cf. [28]), financial leverage can result in problems relating to financial distress or bankruptcy [3] as well as agency [15]. Further, the cost of equity capital increases with financial leverage [13].

Debt and equity have been argued to be more than alternative financial instruments: they are different business governance structures [47]. Accordingly, it is posited that the choice between debt and equity depends on the characteristics of the assets in which the funds are used. Debt governance is more appropriate for
financing redeployable assets, while equity governance is more suitable for non-redeployable assets. Due to the complex and customized nature of systems, applications, and staff, the degree of redeployability of an installed IT infrastructure may be limited. Thus debt governance is not the optimal form of business governance. A high level of debt hence results in a need to reduce the non-redeployable assets which then gives rise to a greater level of IT outsourcing. Thus we test:

**Hypothesis 3:** *The firm's financial leverage will be positively related to the degree of IT outsourcing.*

**IT Competence**

**IT Cost Structure.** Investments in IT has recently escalated, and its importance is nowhere less evident than its dramatic increase from $55 billion to $190 billion in the economy; in fact, IT accounts for about half of most large firms' capital expenditures [18]. Due to the enormous outlay associated with the IT infrastructure, firms have found it necessary to adopt a better cost control approach to IT. In line with this notion, IT must be treated as a capital investment and not just an overhead of the firm. Firms have been plagued by the astronomic rise of IT expenditure in many specific IT areas that are necessary to run the business. For instance, in the area of application development, a critical problem has been the control of the cost of internally conceived software [11]. Consequently, corporations are rationalizing their capital outlay on IT. Where possible, drastic restructuring of the traditional inhouse mode of IT governance is undertaken to trim the high costs of IT infrastructure. As Weizer and Associates [42] put it: "Outsourcing can free capital tied up in data center hardware and save operating costs...."

An extremely attractive option available to firms is to outsource their IT infrastructure to value-added vendors who are more efficient in terms of managing and operating the IT. In three often-cited early cases of IT outsourcing, *American*
Standard reportedly saved $2 million per year for its financial and payroll operations, Copperweld cut its systems budget from $8 million to $4 million, and Foodmaker slashed its data processing costs by 17% [36]. Other recent cases are Wabco and American Ultramar, which trimmed their annual processing costs from $3 million to $1.8 million, and from $3 million to $1.5 million respectively [46]. We thus seek to verify:

**Hypothesis 4:** The firm's IT cost structure will be positively related to the degree of IT outsourcing.

**IT Performance.** With the elevation of the role of IT from the 'backroom' to the 'frontline' of business operations, firms are making IT directly accountable for its direct contribution to the overall corporate profitability. The profit-oriented posture imposed on the IT infrastructure puts intense pressure on the technology to result in tangible economic returns. With the escalating level of IT investments needed to support business in the contemporary marketplace, there is a need to reconfigure the IT infrastructure in ways that make it possible to ascertain the benefits in a clear manner [38]. As IT expenditure rises rapidly over the last decade [41], it is not surprising that managers are more stringent than ever before in assessing the productivity of their IT infrastructure. Thus, when economic profits falls in relation to IT investments, management faces an immense need to re-evaluate the role of IT. As efficiency of organizing is tied intimately to the mode of governance, it is natural that there is a greater shift from the usual inhouse management to external involvement. Indeed, it has been the view within the practicing and consulting IT communities that "outsourcing is a key strategy that enable [companies to] .... improve return on equity" [31]. Therefore, we test:

**Hypothesis 5:** The firm's IT performance will be negatively related to the degree of IT outsourcing.
Figure 3 is a schematic representation of the research model with the five hypotheses.

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Insert Figure 3 here
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Methods

Sample

We began with a sample from the list of companies in a study of 200 major U.S. corporations carried out by G2 Research, Inc. that provided data on their level of IT outsourcing [24]. We also required that the level of total IT expenditure be available for operationalizing some of our independent constructs. Data availability across these two variables limited our study sample to 57 firms (see Appendix A for the list of companies). We collected corresponding data on the independent constructs pertaining to each firm in our sample for the fiscal year 1989 from Standard and Poor’s Compustat II and Lotus’ CD/Corporate on CD-ROM.¹ Thus, our data represents the use of both primary and secondary sources. During discussions with the managers of G2 Research, we ascertained that the data on outsourcing expenditure is an integral part of their professional service to their clients. Our overall assessment is that their method of data collection and verification meets the standards of our research purposes. Further, the integrity of the secondary data sources for the independent constructs is widely accepted within accounting, economics, and finance research.

¹The final sample size is 55 due to missing data in Compustat and CD/Corporate. Our sample comprises a rough split between industrial and service firms (about 40-60). The selection is limited by the availability of data across multiple sources. It is possible that the primary data regarding IT expenditures may have been skewed, since our sources surveyed only large corporate users of IT (e.g., firms within the Fortune 500 and Fortune Service 500 categories). In our sample, the level of IT expenditures as a percentage of revenue is 1.8%. This is compared with another survey [20] that obtained figures for 10 different industries ranging from 0.9% to 4.2%. Although the set of companies used is not a random sample of the entire population of firms in the economy, we believe that our choice of data sources allows us to include a sample that is representative of the set of major users of IT (i.e., large firms).
**Operationalization**

We need to operationalize four key constructs. For the degree of outsourcing (Y), we developed a ratio of IT outsourcing expenditure to total assets for each firm so that the level of IT outsourcing is normalized by firm size. The business cost structure (X1) was computed as the sum of the cost of goods sold and the selling, general, and administrative expenses, divided by net sales and total assets. Business performance (X2) was captured by return of assets and earnings per share (fully diluted and excluding extraordinary items), representing the economic efficiency of the entire business as measured by its assets or equity. For financing leverage (X3), we took the ratios of long-term debt as well as of total liabilities with shareholder equity.

Operationalization of constructs in the IT context is more difficult given the paucity of prior research. The metric used to evaluate the effectiveness of IT has evolved from code analytic (1970-1978), through design analytic (1978-1984) and function analytic (1984-1990), to the current business directed (1990-present) measures [37]. In short, the criteria used is shifting from metrics that focus on IT output to those that focus on the economic outcomes of IT activities. Further, it has been argued that the economic benefit of information systems can be best evaluated by measurements pertaining to the company's entire IT expenditure level, as opposed to the economic benefits derived from individual systems [4]. Thus for IT cost structure (X4), we used the ratio of IT expenditure with both gross plant, property, and equipment (i.e., before depreciation) and net plant, property, and equipment (i.e., after depreciation), which is analogous to the extent in which the physical infrastructure of the firm is represented by the IT infrastructure. IT

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2It is necessary to sum these two 'costs' as the accounting treatment is not consistent for industrial and service firms in the sample.
performance ($X_5$) was measured by net income and sales divided by IT expenditure, which corresponds to the economic efficiency of the IT assets.

In addition, we specified two control variables, one for business size ($X_6$) and another for industry ($X_7$). The size variables included net sales and total assets, while binary dummy variables were formed for service and industrial sectors.

**Analysis**

Due to the possibility of multicollinearity among our independent measures, we performed a factor analysis using the principal components method and a varimax rotation to discern the factor pattern inherent in the data structure. This procedure ensures that the independent constructs used for our subsequent regression are orthogonal. We obtained the corresponding scores associated with a pre-specified set of the four factors for the business context and two factors for the IT context. In our multiple regression, we used the ratio of IT outsourcing expenditure to total assets as the dependent variable and the set of factor scores for the business and the IT contexts and the industry sector dummy variable as the independent variables. The econometric specification for our analysis is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \epsilon$$  \hspace{1cm} (1)

where $\epsilon$ represents the random error.

**Results**

**Descriptive Statistics and Factor Structure**

Table 1 summarizes the means and standard deviations for all the individual indicators, while Table 2 provides the matrix of zero-order correlations. In Table 3, we depict the results of factor analysis for the business and IT contexts. With a varimax rotation, four factors in the business context can be interpreted: (1) business performance; (2) business cost structure; (3) business size; and (4) financing leverage.
Two factors are extracted for the IT context can be interpreted as: (1) IT cost structure; and (2) IT performance.

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Test of Hypotheses

The results of estimating equation (1) are shown in Table 4. The overall model has a F-value of 2.10 (p<0.06), and explains about 24% of the variance, which is acceptable for an exploratory research and a limited number of independent variables. In the business context, we accept H1 since the coefficient for business cost structure is significant at the 0.05 level with the expected sign. In the IT context, we accept H4 and H5 since the coefficients for IT cost structure and IT performance are significant at the 0.1 and 0.05 levels respectively. In contrast, the other two hypotheses (H2 and H3) relating to business performance and financial leverage in the business context are not supported. Further, the two control variables did not emerge as significant.

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Discussions

The empirical results provide general support for our research model. First, H1 was accepted implying that the business cost structure is a critical determinant of IT outsourcing. A high level of business cost structure may motivate a firm to review its overall cost structure reflected in its costs of physical infrastructure (such as plant and equipment) including its IT infrastructure. Such restructuring may signal to the capital markets the strong commitment of corporate management to improve its business efficiency. Further, as IT pervades the entire value chain of the business, the adoption of IT outsourcing may result in a superior control of the
business through the ‘variable costing’ of IT outsourcing, as opposed to the traditional ‘fixed costing’ of inhouse governance.

Second, H4 which posited a positive relationship between IT cost structure and outsourcing was empirically supported. As noted in a trade periodical, “Outsourcing is being seriously considered in more and more organizations as a potential solution to rising IS [information systems] costs” [9, p. 89]. To compete effectively in the modern information era, complex and costly systems are required to support and propel a corporation in its quest for competitive advantage. In particular, the key compelling force driving companies to outsource is cost savings: “In some cases, outsourcing vendors have promised to reduce annual IS outlays by 50%, although 15% to 30% savings are more common” [7, p. 47]. Thus, our empirical finding is consistent with the prevailing view regarding the need to rationalize the IT cost structure in order to stay competitive in the market.

Third, H5 which specified a negative relationship between IT performance and outsourcing was also empirically supported. Low economic returns on IT investment appear to affect the propensity of firms to outsource more of its IT infrastructure to vendors. The present dilemma facing many IT executives appears to be a justification of investing in a IT infrastructure based on its productivity. Although there are several possible metrics to gauge the performance of IT such as reliability, quality, timeliness etc., our results suggest that economic measures are valid indices to evaluate the productivity of IT in terms of the adoption of an efficient mode of IT governance.

Fourth, we did not find empirical support for H2 -- which specified a negative relationship between business performance and outsourcing and H3 -- which specified a positive relationship between financial leverage and outsourcing. The general implication from these two results is that business performance and financial leverage may be too far removed in terms of influencing the level of IT
outsourcing directly. Although we specified direct effects, which were not empirically supported, we urge that future research consider indirect effects (for example, through business and/or IT cost structures) or moderator effects.

Finally, both business size and industry sector as control variables did not emerge as significant determinants. The implication is that our results are generally robust and valid across firms differing in sizes (within the spectrum covered by the sample) as well as industry versus service categorization.

**Toward a Comprehensive Model of IT Governance**

While we have provided some empirical support for a set of conventional wisdom regarding IT outsourcing in this paper, we recognize the limited scope of our model. We suggest a set of directions for refining this line of inquiry in the future. As we move away from the consideration of a firm-level focus using a neoclassical economic perspective, we identify three avenues of future research: (a) an organizational economic model of IT outsourcing; (b) a diffusion process model of IT outsourcing; and (c) an organizational process model of IT outsourcing.

**An Organizational Economic Model of IT Outsourcing.** Research in the general arena of make-versus-buy (including outsourcing) has been anchored within an organizational economic perspective [2], especially transaction cost theory (for a review, see [48]). In addition, agency theory with particular emphasis on constructs such as: goal alignment, incentive payment, and monitoring [15] has the potential to provide insights on the governance of IT outsourcing. Moreover, it may be appropriate to reflect refinements such as the articulation of bargaining and influence costs [26] in the governance of IT infrastructure. For instance, constructs relevant to bargaining costs may involve coordination failure and information acquisition/asymmetry, and those related to influence costs may include exchange facilitation and competition foreclosure. While the present dataset did not allow us to operationalize constructs from an organizational economic perspective, a
research design involving primary data from organizational informants would allow us to better understand and predict not only the degree of IT outsourcing (as done in the present study), but also the mode of outsourcing (see Figures 1 and 2). We are in the midst of such a study.

**A Diffusion Process Model of IT Outsourcing.** In this paper, we have developed a ‘variance’ model [29] for explaining IT outsourcing. We can adopt the view that an IT outsourcing arrangement constitutes an administrative innovation [19, 39]. Such as an argument is based on the emergent departure of many firms from an established hierarchical mode of governing the IT infrastructure toward a market mode. Outsourcing fundamentally transforms the traditional requirements of managing IT from those rooted on an adversarial ‘arms-length’ approach to those structured on a cooperative ‘partnership-based’ relationship. Using a macro-organizational level of analysis, the diffusion model will specifically examine the underlying force that motivates firms to adopt IT outsourcing. With this approach, we can analyze whether the diffusion of IT outsourcing can be explained by imitative behavior. The findings are interesting in view of the prominence of the Kodak-IBM outsourcing contract that purportedly encouraged many other firms to seriously consider such a governance option [34]. We are currently pursuing this diffusion-of-innovation study of IT outsourcing.

**An Organizational Process Model of IT Outsourcing.** Another complementary extension would be to focus on the organizational routines underlying the management of this IT mode of governance by developing a organizational process model. Such a research initiative would go a long way in enhancing our understanding of the new phenomenon in the marketplace. The process model may incorporate new structures (e.g., shared authority; responsibility; property rights; and risk-bearing), management processes (e.g., allocation and coordination of resources; performance assessment; and joint planning), and
managerial roles (e.g., liaison; decision-making; and leadership) that are required to effectively derive the benefits from this mechanism.

**Conclusion**

Based on data from large US corporations, we empirically identified a set of important determinants -- reflecting both IT and business contexts -- of IT outsourcing. Thus, we offer the first empirical assessment of a set of widely-held assertions and beliefs as to why firms outsource their IT infrastructure. We have also identified some important directions for extending this line of inquiry -- reflecting an organizational economic view, a diffusion-of-innovation view, and an organizational process view. We hope that our attempt at empirical testing this emergent phenomenon will stimulate others to look at this important strategic challenge facing firms from a rigorous theoretical perspective. Such research initiatives will allow us not only to better understand this complex phenomenon but also derive useful management prescriptions grounded on systematic theory-based research.
REFERENCES


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APPENDIX:
List of Companies in the Sample

Aetna Life and Casualty Co
Air Products and Chemicals
Amex Inc
Armco Inc
Ashland Oil Inc
Atlantic Richfield Co
Bank of Boston Corp
Bankamerica Corp
Baxter International Inc
Champion International Corp
Chrysler Corp
Consolidated Rail Corp
Continental Bank Corp
Control Data Corp
Corning Inc
CSX Corp
Dow Chemical Co
E I Du Pont De Nemours and Co
Duke Power Co
Eastman Kodak Co
Entergy Corp
First Bank System Inc
Fleming Cos Inc
Geico Corp
General Dynamics Corp
General Electric Co
General Re Corp
Great Western Financial Corp
GTE Corp
Harrier Inc
Homefed Corp
Illinois Power Co
Ingersoll Rand Co
Keycorp
Lincoln National Corp
Mack Trucks Inc
Manufacturers Hanover Corp
NCR Corp
Norfolk Southern Corp
PNC Financial Corp
Quantum Chemical Corp
Reynolds Metals Co
Rockwell International Corp
Rohm and Haas Co
SCECorp
Security Pacific Corp
Sun Co Inc
Texaco Inc
Textron Inc
Travelers Corp
UAL Corp
Union Carbide Corp
Unisys Corp
United Technologies Corp
US Air Group Inc
Valley National Corp
Westinghouse Electric Corp
### TABLE 1
Means and Standard Deviations

<table>
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<tr>
<th>Description</th>
<th>Variable</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outsourcing Expenditure/ Total Assets</td>
<td>OSTA</td>
<td>0.002578</td>
<td>0.004085</td>
</tr>
<tr>
<td>Cost of Goods Sold+Selling, General, &amp; Administrative Expenses/ Sales</td>
<td>CSSA</td>
<td>0.8336</td>
<td>0.1555</td>
</tr>
<tr>
<td>Cost of Goods Sold+Selling, General, &amp; Administrative Expenses/ Total Assets</td>
<td>CSTA</td>
<td>0.6754</td>
<td>0.6706</td>
</tr>
<tr>
<td>Long-Term Debt/ Shareholders’ Equity</td>
<td>LDSE</td>
<td>0.4783</td>
<td>1.989</td>
</tr>
<tr>
<td>Total Liabilities/ Shareholders’ Equity</td>
<td>TLSE</td>
<td>5.138</td>
<td>7.005</td>
</tr>
<tr>
<td>Return on Assets</td>
<td>REOA</td>
<td>0.02667</td>
<td>0.06765</td>
</tr>
<tr>
<td>Earnings per Share ($)</td>
<td>EAPS</td>
<td>3.089</td>
<td>5.257</td>
</tr>
<tr>
<td>IT Expenditure/ Gross Plant, Property, &amp; Equipment</td>
<td>ITGP</td>
<td>0.1355</td>
<td>0.1748</td>
</tr>
<tr>
<td>IT Expenditure/ Net Plant, Property, &amp; Equipment</td>
<td>ITNP</td>
<td>0.1522</td>
<td>0.1738</td>
</tr>
<tr>
<td>Net Income/ IT Expenditure</td>
<td>NIIT</td>
<td>2.385</td>
<td>7.298</td>
</tr>
<tr>
<td>Sales/ IT Expenditure</td>
<td>SAIT</td>
<td>56.91</td>
<td>44.81</td>
</tr>
<tr>
<td>Total Assets ($ million)</td>
<td>ASSE</td>
<td>21000</td>
<td>26500</td>
</tr>
<tr>
<td>Sales ($ million)</td>
<td>SALE</td>
<td>9405</td>
<td>9877</td>
</tr>
<tr>
<td>Service Sector</td>
<td>SERV</td>
<td>0.5965</td>
<td>0.4950</td>
</tr>
<tr>
<td>Industrial Sector</td>
<td>INDU</td>
<td>0.4035</td>
<td>0.4950</td>
</tr>
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</table>
### TABLE 2
Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>OSTA</th>
<th>CSSA</th>
<th>CSTA</th>
<th>LDSE</th>
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Note: See Table 1 for a description of the variables. (**), (***), and (*) denote two-tailed significance at 0.01, 0.05, and 0.10 levels respectively.
### TABLE 3
Factor Analysis Results

#### 3(a) Factor Structure for Business Context

<table>
<thead>
<tr>
<th>Variables</th>
<th>Factor 1 (Business Performance)</th>
<th>Factor 2 (Business Cost Structure)</th>
<th>Factor 3 (Business Size)</th>
<th>Factor 4 (Financial Leverage)</th>
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#### 3(b) Factor Structure for IT Context

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Note: See Table 1 for a description of the variables.
### TABLE 4
Multiple Regression Results

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Note: (***), (**) , and (*) denote one-tailed significance at 0.01, 0.05, and 0.10 levels respectively.
FIGURE 1
Outsourcing versus Insourcing

- **INSOURCING**
  - High Internalization of Human Resources
  - Data Processing
  - Systems Integration
  - Systems Design/Planning
  - Telecoms/Network
  - Application Development

- **OUTSOURCING**
  - Low Internalization of Physical Resources
  - Data Center
FIGURE 2
Characteristics of Different IT Outsourcing Modes
FIGURE 3
The Research Framework

Business Governance

Financial Leverage

H3(+)

IT Governance

Business Competence

Business Cost Structure

H1(+)

Business Performance

H2(-)

Business Governance

IT Outsourcing

H4(+)

H5(-)

IT Competence

IT Cost Structure

IT Performance
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