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*Executives' Perceptions of the Business Value of Information
Technology: A Process-Oriented Approach*

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ABSTRACT

Despite significant progress in evaluating the productivity payoffs from information technology (IT), the inability of traditional firm-level economic analysis to fully account for the intangible impacts of IT has led to calls for a more inclusive and comprehensive approach to measuring IT business value. In response to this call, we develop a process-oriented model to assess the impacts of IT on critical business activities within the value chain. Our model incorporates corporate goals for IT and management practices as key determinants of realized IT payoffs. Using survey data from 304 business executives worldwide, we found that corporate goals for IT can be classified into one of four types: unfocused, operations-focus, market-focus and dual-focus. Our analysis confirms that these goals are a useful indicator of payoffs from IT in that executives in firms with more focused goals for IT perceive greater payoffs from IT across the value chain. In addition, we found that management practices such as strategic alignment and IT investment evaluation contribute to higher perceived levels of IT business value.

Introduction

Business and information systems (IS) executives continue to struggle with a host of complex issues involved in determining payoffs from investments in information technology (IT). Some insights into the extent of payoffs from IT can be gleaned from firm-level research on the “productivity paradox”, principally in the form of positive, and in some cases, excess returns to IT investment [9, 17, 32]. However, as the primary focus of these studies has been on the productivity impacts of IT, other impacts such as improved inventory management, greater product variety and enhanced customer service, have been excluded from an analysis of IT payoffs. The need to consider these broader economic and strategic impacts has led to increased calls from IS researchers and practitioners for a more inclusive and comprehensive approach to measuring IT business value [7, 29, 33].

In response to this call, we introduce a process-level model of IT business value – defined as the contribution of IT to firm performance. In order to assess the payoffs from IT at the process-level, our model focuses on how IT impacts critical business activities within the corporation’s value system. These activities, which include aspects of production, logistics, sales and marketing, customer service and administrative support, are usually shown in the context of the value chain [42], though “value shops” or “value networks” are equally valid representations [51]. However, as our model involves process-oriented measures of IT business value, our primary concern is with the substance of the activities themselves, rather than their structure as chains, shops or networks. Then, using these activities to represent the locus of value within the firm, we use business executives’ perceptions to assess the actual, rather than the expected, impacts of IT on each activity.

Our decision to focus on business executives is an acknowledgment of the increasing role that these individuals have in IT investment decisions [28]. As corporations recognize the potential for IT to deliver strategic impacts, business executives pursue a more active role in deciding how, when and where IT resources should be used. Notwithstanding this expanded level of involvement, previous studies have

shown that business executives tend to be highly critical of IT. For instance, in a recent global study of 659 CEOs by the London School of Economics, only 25% expressed satisfaction with the performance of their IT investments [12]. While this result is indicative of the frustration sometimes voiced by executives when dealing with IT investment decisions, it is also a reflection of executives' personal experiences with IT and feedback provided by subordinates. Yet by virtue of their seniority within the corporation, we argue that business executives are in an ideal position to identify how and where IT creates value for the business. Finally, an understanding of executives' views can provide a useful entrée into the debate on IT payoffs and beyond that, contribute to a broader discussion of how IT can support the business strategy.

Although our approach to measuring IT business value complements that of previous firm-level research, there are a number of important differences. First, in order to understand executives' perceptions of IT impacts, we consider these impacts in the context of the firm's goals for IT. This allows us to label firms as being focused or unfocused in how they use IT to support the business strategy. There is already an established basis in the IT literature for using this approach to compare IT payoffs between firms. For example, using the Strategic Grid to denote different organizational roles for IT, Premkumar & King [45] found that executives' assessment of how IT contributes to firm performance was closely related to the role of IT in their corporations. Second, we employ multiple process-level measures of realized IT impacts that map directly to critical business activities within the value chain. Third, in recognition of the espoused link between management practices and IT payoffs [22,23, 52], we assess how differences in corporate goals for IT can lead firms to adopt different management practices. There is already some evidence from firm-level research to suggest that firms choose management practices to suit their goals for IT [45, 46]. By combining these different streams of research, our objective is to determine if there is a relationship between corporate goals for IT, management practices and IT payoffs at the process-level.

Insert Figure 1 about here

Figure 1 provides an overview of our conceptual model, showing the links between goals for IT, management practices and realized IT impacts. From this, we derive the following research questions:

1. Do executives have different goals for IT?
2. Where within the value chain do executives perceive value from IT?
3. What is the relationship between goals for IT and perceived IT payoffs?
4. To what extent can IT management practices improve the overall level of IT business value?

The remainder of this paper is organized as follows. In the next section, we present a theoretical justification for using a process-oriented approach and describe our motivation for using executives' perceptions as a proxy measure for realized IT payoffs. We then review the research variables in our process-oriented model and present a set of six hypotheses based on the model. This is followed by a discussion of the data and methodology used to test the model. In the subsequent section, we present and discuss our results with a brief assessment of managerial implications. Finally, in the concluding section, we consider the limitations of the study and identify areas for further research.

Theoretical Background

In order to provide a theoretical basis for our research model, we examined the research literature from two related perspectives. First, since we use executives' perceptions as proxy measures for realized IT payoffs, we must first determine the extent to which executives can assess process-level impacts of IT. Second, although researchers have advocated a process-level analysis of IT payoffs, there is still a dearth of empirical evidence supporting this form of analysis. Therefore, we need to motivate our choice of process-level measures within the context of some generally accepted organizational framework.

Executives' Perceptions: A Proxy for Realized Value

In the absence of objective data on IT payoffs, executives' perceptions can at least help to pinpoint areas within the corporation where IT is creating value. However, the legitimacy of perceptual measures as a proxy for objective measures of IT business value is still open to debate for two reasons. First, as with any form of self-reported data, there is a possibility that executives (and IS executives in particular) will exaggerate their views on IT impacts as a means of self-promotion. Second, the sheer complexity of

modern corporations, both in terms of organization structure and market uncertainty, complicates the task of giving an accurate assessment of the “true” payoff from IT.

Research has succeeded in alleviating some of these concerns by showing, for example, that perceptual measures of firm performance correlate strongly with more traditional objective measures. For example, in a study by Venkatraman & Ramanujam [55], senior executives were asked to rate their firm’s performance relative to that of major competitors using a number of different performance criteria, including sales growth, net income growth and ROI. The resulting high degree of correlation between perceptual and objective performance measures led the authors to conclude that, “perceptual data from senior managers . . . can be employed as acceptable operationalizations of [business economic performance]” (p. 118). Adding to this, executives’ perceptions of IT payoffs have been found to correlate with more traditional economic performance measures such as revenues, net profit and productivity [53].

Although perceptual measures have been widely accepted in organizational research [31], they have only recently begun to appear in the IS literature. For example, DeLone & McLean [16] argue that executives are ideally positioned to act as key informants in a qualitative assessment of IT impacts in their corporations. There is a twofold basis for this argument. First, as direct consumers of IT, executives can rely on personal experience when forming an overall perception of IT impacts [15, 48]. Second, as business executives become more involved in IT investment decisions, they are increasingly exposed to the views of peers and subordinates regarding the performance of previous IT investments [57]. When combined, these arguments confirm that executives are an important source of information on IT impacts, thereby supporting the use of executives’ perceptions in evaluating IT payoffs.

A number of other studies show that executives’ perceptions are key to understanding how IT impacts firm performance. For example, researchers found that a CEO’s perceptions and attitudes towards IT and the sense of importance they attribute to IT are strongly associated with an organization’s progressive use of IT [10, 28]. In turn, managerial knowledge of, and attitudes towards, IT and the IT climate within an organization are useful indicators of how IT is used to support the business strategy [5].

Adding to this, Grover, Teng, Segars & Fiedler [20] used perceptual data from IS executives to uncover a link between IT diffusion, process change and productivity gains for each of eleven different technologies. Finally, Broadbent & Weill [6] posit a relationship between managerial perceptions of the role of IT infrastructure, the perceived value of that infrastructure, and IT investment biases. Looking across these studies, it is evident that business executives are increasingly aware of the role of IT and are more willing to take part in IT investment decisions as a way to ensure that IT delivers on its promises.

While some researchers might insist that there is still no substitute for economic and financial measures of IT payoffs, the above studies provide some support for using perceptual measures to assess IT payoffs. It is important to stress, however, that our use of perceptual measures is not meant as a way to replace or displace traditional economic or financial measures. Instead, we are arguing that perceptual measures constitute an alternative approach to measuring IT payoffs – objective and perceptual measures can co-exist. Indeed, we have found in our discussions with business executives over the years, a growing appreciation for perceptual measures. The important point here is that while executives say that objective measures are desirable, they acknowledge that it is not always possible to compute an exact measure of IT value. Therefore, even without access to hardcore metrics, executives may still rely on their perceptions in determining whether or not a particular IT investment is creating value for the corporation – a perception based as much on personal experience and peer evaluations as on underlying performance expectations.

A Process-Oriented Approach to Evaluating IT Business Value

The disparate nature of an organization's IT investments and their associated impacts complicates the task of forming an overall firm-wide assessment of IT payoffs. One way of simplifying this task is to adopt a classification scheme that groups measures which share common investment objectives such as administrative cost reduction, productivity improvement and customer service enhancement [29]. This approach is supported by a growing number of researchers who advocate a process-oriented assessment of IT business value based on the argument that the first-order impacts of IT investment occur at the process-level [3, 14, 38]. This process-centric perspective argues that IT creates value for the organization

by improving individual business processes, or inter-process linkages, or both. Consequently, the greater the impact of IT on individual business processes and on inter-process linkages, the greater will be the contribution of IT to firm performance.

While there are many recognized ways to depict the processes within an organization, the value chain is perhaps one of the most widely known [42]. The value chain divides an organization into a sequence of primary activities (inbound logistics, operations, outbound logistics, marketing and sales, and service) and support activities. The use of IT within each of these activities enhances the value-creating potential of the organization [44]. Although the value chain is synonymous with the conversion of inputs into outputs, and is, therefore, more identifiable in a manufacturing context, we expand our concept of value to include what Stabell & Fjeldstad [51] refer to as “value shops” and “value networks”. Value shops are indicative of service-type organizations where IT is directed at solving a particular problem. In such situations, IT creates value by allowing management to better identify problems and execute solutions. Value networks, on the other hand, create value by using IT to mediate a network relationship between customers or suppliers such as in the banking or telecommunications industries. As Stabell & Fjeldstad note, “all three [value] configurations have in common a focus on critical value activities” (51, p. 433). Accordingly, by analyzing the impacts of IT on these “critical value activities”, we can develop multiple process-level measures of IT business value that can apply equally to any value structure. In Table 1, we present some examples from the IS literature of ways in which IT impacts different business activities within the value chain. By developing process-level measures around these activities, we can provide a richer assessment of IT business value than if using a single firm-wide measure [59].

Insert Table 1 about here

Research Model and Hypotheses

In characterizing business strategy, Porter [43] suggests that corporations differentially focus on two key business objectives, *operational effectiveness* and *strategic positioning*. While both foci are necessary for “superior” firm performance, each works in unique ways. For example, operational

effectiveness entails performing similar activities better than rivals, while strategic positioning entails performing different activities or performing similar activities, but in strategically different ways. Corporations that focus on operational effectiveness “get more out of their inputs than others because they eliminate wasted effort, employ more advanced technology, motivate employees better, or have greater insights into managing particular activities . . . operational effectiveness includes, but is not limited to, efficiency” (p. 62).

While operational activities allow some degree of flexibility in responding to market needs, they are not as successful as activities that create and enhance strategic positioning within an industry. For example, by redefining the notion of service offerings, Southwest Airlines’ focus on low cost, no frills air travel has made it one of the most successful airlines in the U.S. with record levels of profitability and consistent high marks for customer service. Since strategic positioning is customer-dependent, firms such as Southwest Airlines can improve their performance by extending their access to customers in existing markets or by changing the prevailing structure or practices within their industry.

Corporate Goals for IT

As shown in Table 2, Porter’s distinction between operational effectiveness (*efficiency and effectiveness*) and strategic positioning (*reach and structure*) can be translated directly into corresponding goals for IT. For example, efficiency is achieved by using IT to reduce operating costs or to improve productivity, while effectiveness comes from using IT to foster greater flexibility and responsiveness to changing market needs. Finally, reach involves using IT to extend geographic reach or customer-access, while structure involves using IT to change industry or market practices.

Insert Table 2 about here

In Figure 2, we use this association between business strategy and goals for IT to develop an *a priori* classification of firms based on whether their goals for IT emphasize operational effectiveness, or strategic positioning, or both. Firms in the lower left quadrant are labeled “unfocused” since they have no clear goals for IT or are indifferent towards IT. This sense of indifference often leads to a situation in

which IT spending is viewed as an expense to be minimized rather than an investment to be managed. It is likely that for business executives in these firms, past experiences with IT have been largely negative. As a result, they adopt a wait and see attitude to technology investment, preferring to delay investment to the point beyond which there is no alternative. For example, in a series of interviews¹ with business and IS executives, conducted during the initial stages of this research, an executive in a plastics company remarked, *“IT is a real time burner and operational expense that can easily get out of hand. We don’t have any strong goals for IT – we do what we have to do. We follow the industry when it is really clear that we have to, or we’ll be left behind.”* While resorting to a follower status is understandable, failure to formulate clear goals for IT can lead to problems elsewhere. For example, if executives are indifferent towards IT, they will likely mismanage or under-manage their IT investments, leading to a vicious cycle that erodes the potential for realizing payoffs from both existing and future IT investments.

Insert Figure 2 about here

In contrast, “operations-focus” firms in the upper left quadrant have clearly defined goals for IT centered on operational effectiveness. In such cases, IT is primarily used to reduce operating costs and to enhance the overall effectiveness of business operations by focusing on quality, speed, flexibility and time-to-market. An executive in an oil company we visited epitomized this view: *“We [first] wanted to improve exploration and production efficiency. This involved using IT to reduce cycle times to find, drill and put product into production. It also involved using IT to reduce our costs and to increase our exploration success ratio. We [also] wanted to improve organizational planning and management support. This involved using IT to improve the efficiency and effectiveness of core processes in finance, human resources, procurement and so forth.”* As indicated by these comments, executives in operations-focus firms believe that by using IT to gain greater control over their internal processes, they will be better able to respond to environmental uncertainty and the emergence of new competitors.

¹ A total of 43 hour-long interviews were conducted with executives in 25 U.S. corporations. The primary purpose of these interviews was to identify items for inclusion in the survey instrument, namely what were executives’ goals for IT and what issues did they consider in evaluating IT investment decisions.

Meanwhile, “market-focus” firms in the bottom right quadrant use IT to enhance their strategic positioning. Based on our interviews with senior executives, we found that market-focus firms use IT to create or enhance a value proposition for their customers. For example, as explained by an executive in a computer company we visited: *“Twelve years ago, we didn’t differentiate much between our largest and smallest customer – today we do. Our customer strategy is one area where our business model has evolved. Segmentation gets us closer to our customers and allows us to understand their needs in a really deep way. This closeness gives us access to information that’s absolutely critical to our strategy.”* Although market-focus firms might be more externally focused in their goals for IT, they are by no means deficient at using IT for operational purposes. Indeed, one could argue that a customer-oriented focus requires some degree of operational emphasis in order to be successful.

Finally, while some firms focus on using IT for operational effectiveness or strategic positioning, an increasing number of firms recognize that IT can support both foci simultaneously. Firms that embrace this “dual-focus” approach, extend their use of IT beyond operational effectiveness to include market reach and new market creation. For example, an executive in an information services company remarked: *“We are information purveyors. IT is used throughout the value chain, though principally to distribute information. The biggest payoff from IT to date is on the product side, mainly in relation to the enhancement or creation of new products. We expect that there is a link between [IT] and better service, leading to greater value for our clients and higher market share overall.”* Based on our interviews with business and IS executives in dual-focus firms, we found that their goals for IT contain both top line (revenue growth) and bottom line (profitability) elements. To achieve this level of performance, dual-focus firms need to be astute managers of IT. In sharp contrast to unfocused firms, executives in dual-focus firms are fully convinced that IT is key to their current and future business success.

As we look across each of the four quadrants in Figure 2, we find an implied ordering of goals for IT reflecting different levels of strategic intent for IT. Based on Porter’s argument that firms which favor strategic positioning over operational effectiveness will achieve superior levels of firm performance, we

extend this argument to say that firms with more focused or strategic goals for IT will also realize higher levels of IT business value. Hence:

H1: Executives in firms with more focused goals for IT will perceive higher levels of IT business value.

Management Practices

Management practices play a key role in creating IT business value as evidenced by the fact that firm effects – of which management practices are a quintessential form – account for over 50% of the variance in firm performance [8]. Consequently, an assessment of management practices is key to understanding how IT creates value for the firm. Based on our interviews with business and IS executives, we decided to focus on two prominent IT management practices: strategic alignment and IT investment evaluation. Both practices are complementary in the sense that as individual IT projects go through successive stages of planning and appraisal, some effort is made to better align the IT investment with the business strategy [34]. Finally, since each practice is influenced by goals for IT [45], each will likely contribute to IT business value.

Strategic Alignment. Strategic alignment or the alignment of IT with the business strategy, has been consistently ranked as the single most important issue facing business and IS executives in Europe and North America [13]. This persistent interest in strategic alignment is especially warranted as researchers argue that firms' inability to realize sufficient value from their IT investments is due in part to an absence of strategic alignment [21, 58]. If payoffs from IT investment are a function of strategic alignment, then any attempt to increase IT business value must consider the extent to which IT is aligned with the business strategy. Strassmann [52] echoes this point in arguing that "if the consequences of individual computer projects [are] clearly linked with a firm's planning and budgeting commitments . . . then computer investments have a chance of becoming catalysts of organizational change instead of discrete expenses" (p. 4). Based on our argument that corporations' with more focused goals for IT will realize higher levels of IT business value, we extend this argument to say that firms with more focused

goals for IT will also achieve higher levels of strategic alignment. Hence, we derive the following two hypotheses:

H2: Executives in firms with more focused goals for IT will perceive higher levels of strategic alignment.

H3: Higher levels of strategic alignment contribute to higher levels of IT business value.

IT Investment Evaluation. Before deciding to invest in IT, most firms will typically conduct a feasibility study or pre-implementation review to determine, among other things, the likely impact of the investment on the corporation. For example, an IT investment might be conditional on a positive cost-benefit analysis or a favorable net present value calculation. As corporations use IT for more strategic purposes, there is an even greater need for these investments to undergo routine, systematic and recurring evaluation. Despite this, fewer than 25% of firms use formal ROI measures in evaluating IT investments while only 45% of firms consider ROI a requirement for “major” IT investments [56].

As an alternative to using ROI or other objective criteria in evaluating IT investment decisions, an executive in a banking firm we interviewed remarked: “*We [base our decision] on a vision of ‘this is where things have to go’, as opposed to what are the real business returns.*” Adding credence to the use of more subjective criteria, a senior executive in a biotechnology company added, “*no single measure is perfect, so one has to use different measurements; some may be quantitative, and some qualitative, and some a combination of both.*” While these comments help to illustrate the importance of IT investment evaluation, they also raise the question of whether IT investments that undergo systematic evaluation will realize higher IT payoffs than investments which are more a function of gut feeling, intuition or blind instinct. Related to this, there is an argument that firms with different goals for IT will make different use of IT evaluation techniques. For example, since unfocused firms have no clear goals for IT and do not see IT as being critical to their business success, it follows that executives in these firms will see little reason to engage in extensive planning and appraisal exercises. Hence:

H4: Firms with more focused goals for IT will make greater use of IT investment evaluation.

Besides using IT evaluation techniques to establish the feasibility of specific IT investments, Venkatraman, Henderson & Oldach [55] argue that IT evaluation or “value management” is a useful mechanism for achieving strategic alignment. Value management denotes “actions taken to (1) establish the means to select IT investments, (2) define the performance management system that will maximize the likelihood that these investments will achieve desired benefits, and (3) learn how to adapt performance management over time” (p. 146). Implicitly, a central tenet of value management is an ability to somehow differentiate between investment decisions on the basis of organizational impact. If executives have adopted a “value management” approach to strategic alignment, they will systematically allocate resources to the most deserving areas of the corporation according to some set of established principles, priorities or investment criteria. Without an effective evaluation policy or a set of investment guidelines, there is a risk that IT investments will not support the business strategy. Indeed, Strassmann [52] argues that “the approval of a proposed investment is only the starting point for a continually widening gap between the stated objectives and the capacity to deliver results” (p. 5). Therefore, strategic alignment has a key role to play in the determination of IT payoffs. Hence:

H5: Firms that make greater use of IT evaluation techniques will achieve higher levels of strategic alignment.

Earl [18] argues that an audit of IT investments – including both pre and post implementation reviews – is key to the success of those investments. Pre-implementation techniques are synonymous with IS planning since they focus on the technical, organizational and financial aspects of an investment. Although these reviews allow IT managers to differentiate between IT investments on the basis of implied net benefits and so better manage their IT portfolio, Earl [18] argues that post-implementation reviews are even more critical. For example, by conducting reviews at regular time intervals, IT managers can assess realized IT payoffs against their original objectives and initiate corrective action where necessary. As a consequence of this intervention, post-implementation reviews can serve as a useful learning tool for IS managers [18, 52]. If these reviews help to underscore “best practice”, managers can apply any lessons

learned to future IT investment decisions. Therefore, the learning value that results from post-implementation reviews can contribute to higher levels of IT business value. Hence:

H6: Use of post-implementation techniques yields higher perceived levels of IT business value than pre-implementation techniques alone.

Data and Methodology

In order to test the foregoing hypotheses, during mid to late 1998, we mailed surveys to a random sample of business executives in approximately 1,500 firms worldwide.² This number represented both Fortune 1000 U.S. companies and other non-U.S. companies with similar size and operating characteristics to those in the Fortune 1000. The survey targeted a range of business executives in these firms including, but not limited to, the CEO, CFO and COO. Responses were received from 304 executives – one per firm – yielding an overall response rate of 20.3%. Summary characteristics of the firms in our sample are shown in Table 3. Since our sample represents a wide range of companies, we used a one-way analysis of variance to determine if responses varied by geographic location, position of respondent, industry or firm size. No significant differences were noted suggesting that perceptual measures of IT impacts are unbiased by variations in geographic location, respondent, industry group or firm size.

Insert Table 3 about here

Measuring Corporate Goals for IT

Strategic intent or corporate goals for IT were measured using four items (derived from Table 2). Executives were asked to rate the extent to which they agreed with each item using a 7-point Likert scale where “1” indicates “do not agree” and “7” indicates “agree completely” (all survey items are listed in the appendix). Based on executives’ responses to these items, firms were assigned to one of four quadrants shown in Figure 2. For example, if executives rated four or less on each item, they were assigned to the

² This survey represents a cooperative effort between the authors, the Economist Intelligence Unit (EIU) and IBM Global Services. A general report outlining the main findings of the study is available from EIU [19].

“unfocused” group since their responses suggested they had no discernible goal for IT. If executives rated five or above on the first two items (operational effectiveness) and four or less on the second two items (strategic positioning), they were assigned to the “operations-focus” group. Alternatively, if executives rated four or less on the first two items and five or above on the second two items, they were assigned to the “market-focus” group. Finally, if executives rated five or above on all four items, they were assigned to the “dual-focus” group. In this manner, the 304 firms in our study were assigned as follows: unfocused: 48 (16%); operations-focus: 138 (45%); market-focus: 25 (8%); dual-focus: 93 (31%).

Based on the above classification, operations-focus emerges as a dominant goal for IT, indicating that a significant number of firms are still primarily using IT to reduce operating costs, improve quality and increase productivity. As 44% of the firms in this category are in manufacturing, an emphasis on using IT for operational purposes is to be expected. Meanwhile, almost one-third of firms are classified as dual-focus, indicating that for a significant number of firms, IT is seen as a way to provide both operational and strategic benefits – no industry group was dominant here. Only 25 firms were classified as having market-focus goals for IT, perhaps indicating that before IT can be used for strategic positioning, there must be a solid core of IT in critical firm infrastructure and key internal processes. Since 52% of the firms in this category are engaged in business and professional services, their relative lack of operational emphasis is understandable. Finally, 16% of firms indicate that they had no overall goals for IT – 44% of which are engaged in manufacturing.

Using a discriminant analysis of the four items used to measure goals for IT, we attempted to validate our classification of firms into the four focus types. As shown in Table 4, the result of this analysis provides considerable support for our initial classification with 85% of the firms being correctly predicted. The only category where prediction was weak (44%) involved market-focus firms. However, as these firms constitute only 8% of the total sample, we felt that a re-classification was not warranted.

Insert Table 4 about here

Process-Level Measures of IT Business Value

Based on our earlier review of the research literature on IT impacts (see Table 1), we compiled a list of 30 items to assess the impact of IT on various critical business activities within the value chain. Several of these items were adapted from earlier firm-level research by Mahmood and Soon [36], Sethi and Carraher [49] and Sethi and King [50]. The 30 items were then grouped into six critical activities or process areas – *process planning and support*, *supplier relations*, *production and operations*, *product and service enhancement*, *sales and marketing support* and *customer relations* – and worded in a way that would apply equally to manufacturing and service firms. In this way, the 30 items (5 items per process) span the value chain, capturing a range of IT impacts across both primary and secondary activities.³

In order to measure IT business value, executives were asked to evaluate the impacts of IT on different business activities using a 7-point Likert scale where “1” indicates “low realized impacts” and “7” indicates “high realized impacts”. Respondents were asked to restrict their answers to value already realized rather than value expected in the future. To test if the 30 items would factor into their respective processes, we initially performed an exploratory factor analysis (maximum likelihood estimation). As shown in Table 5, using the Eigenvalue rule, a six-factor structure emerged explaining 71.3% of the total variance. Without exception, all items factored under their respective process headings. Reliability was also assessed using Cronbach’s Alpha and in each case, as shown in Table 5, was found to exceed a suggested minimum of 0.80.⁴

³ This set of 30 items was extensively tested in earlier surveys of business executives in 1995 (N=196) and 1996 (N=152). Factor analysis and reliability measures were used each time to identify ambiguous items and to further refine the items. Before the current survey was administered in mid 1998, comments were solicited from two “Fortune 500” CIOs, two IBM senior consultants and two EIU researchers as to the clarity and structure of the overall survey and to ensure that the wording of the business value items did not present difficulties for business executives.

⁴ As a further check on our work, we performed a confirmatory factor analysis (CFA) on the 30 items using structural equation modeling. CFA is suitable where there is evidence from previous research that the items have factored correctly [4]. Since our items had been extensively tested in previous surveys, we felt that there was some justification for using CFA. The fit of the resulting model confirms that the 30 business value items factor correctly ($\chi^2 = 666.192$, $df = 390$, $p < 0.001$; CFI = 0.95). Finally, structural equation modeling was also used to determine if convergent and discriminant validity was present. Once again, no problems were encountered.

Measures of IT Management Practices

Strategic alignment was measured using a single item. Executives were asked to indicate the extent to which their IT strategy supports their business strategy using a 7-point Likert scale where “1” indicates “no support” and “7” indicates “strong support”. Although there are more elaborate ways to measure strategic alignment (for example, see Chan, Huff, Barclay & Copeland [11]), we favored a more direct approach.

IT investment evaluation was measured using four items (two items each for pre-implementation and post-implementation). In constructing our pre-implementation items, we wanted to capture the extent to which all IT investments were subject to routine appraisal and the extent to which large IT investments were subject to executive management approval [56]. The two post-implementation items considered whether reviews were routinely performed after an IT investment had been implemented and whether afterwards there was a pattern of regular and continuous follow-up reviews [18]. All items were measured using a 7-point Likert scale, with executives being asked to indicate the extent to which each technique was used, where “1” indicates “never used” and “7” indicates “use is mandatory”.

An analysis of the responses to these four items produces some interesting insights. For example, 54% of the firms in our sample consider senior executive approval of large IT investments as mandatory. Eighty nine percent of firms rated “5” or above on this item, indicating that the vast majority of firms consider some form of executive approval for large IT investments. Justification before purchase is also used by the vast majority of firms – 86% of firms rated “5” or above with 41% of firms considering this as mandatory. Post-implementation reviews, in contrast, emerge as the exception, rather than the norm. For example, only 13% of firms considered formal post-implementation reviews as mandatory – 52% of firms rated “5” or above on this item suggesting that most firms perform some post-implementation reviews. Regular reviews received similar treatment – only 12% of firms considered regular reviews as

mandatory with 52% of firms again rating “5” or above. Finally, exploratory factor analysis was used to determine if the four items could distinguish between pre and post-implementation techniques. As shown in Table 5, a two-factor structure emerged explaining 88.1% of the total variance. Although reliability for each factor was marginally under 0.8, it was still sufficiently high.

Results

We begin an analysis of the data by considering the relationship between corporate goals for IT and perceptions of realized IT impacts. Based on the results of our earlier factor analysis and reliability measures, we formed composite variables for each of the six critical business activities by averaging the five items under each process heading. Using a one-way analysis of variance by focus type, we then examined whether there were differences in realized IT impacts. As shown in Table 6, the results of this analysis identify significant differences between each focus type across each of the six business activities.

Insert Table 6 about here

The extent of these differences is more readily seen in Figure 3, where we depict the means (from Table 6) of the perceived IT impacts for each focus type across each of the six business activities. What this figure clearly illustrates is the existence of “levels” of perceived IT payoffs. Specifically, executives in dual-focus firms perceive the highest “level” of IT business value, followed by executives in market-focus, operations-focus and finally unfocused firms. This finding provides support for H1 in that executives in firms with more focused goals for IT systematically perceive higher levels of IT business value throughout the value chain. This confirms that corporate goals for IT are an important determinant of perceived payoffs from IT.

Insert Figure 3 about here

Further analysis of the “peaks” across each of the different levels in Figure 3 points to a link between the main locus of perceived IT business value within the value chain and corporate goals for IT. For example, for operations-focus firms, the primary locus of perceived value occurs in *production and*

operations – activities which are central to a business strategy that emphasizes operational effectiveness. In contrast, executives in market-focus firms perceive their highest IT payoffs in *customer relations*; again, consistent with a business strategy that emphasizes strategic positioning. Finally, for dual-focus firms, the primary locus of perceived IT business value occurs at two points: *production and operations* and *customer relations*. Once more, the locus of value is consistent with a combined focus on operational effectiveness and strategic positioning. Finally, executives in unfocused firms perceive consistently lower IT payoffs than all other focus types – consistent with their indifference towards IT and overall lack of goals for IT.

The Contribution of IT Management Practices

We indicated earlier that an analysis of IT management practices could provide useful insights into why firms with more focused goals for IT might achieve higher levels of IT payoffs. Firms with more focused goals for IT, we argued, must make greater use of certain key IT management practices (strategic alignment and IT investment evaluation) in a way that contributes to greater IT payoffs.

We begin our evaluation of IT management practices by analyzing the link between strategic alignment and corporate goals for IT. We used a one-way analysis of variance by focus type to determine if firms with different goals for IT achieved different levels of strategic alignment. As shown in Table 7, significant differences were found, $F(3,300) = 7.654, p < 0.001$. As further indicated by the mean values for strategic alignment in Table 7, executives in firms with more focused goals for IT perceive higher levels of strategic alignment. Therefore, H2 is supported.

Insert Table 7 about here

Researchers argue that strategic alignment is an important determinant of IT business value [21]. Using partial correlations to control for the effects of goals for IT, we examine the correlation between strategic alignment and IT payoffs. As shown in Table 8, the results of this analysis confirm that even after controlling for goals for IT, there is still a significant positive correlation between strategic

alignment and IT payoffs for each critical business activity within the value chain. This result confirms that higher levels of strategic alignment are associated with higher perceived levels of IT business value⁵, independent of corporate goals for IT. Therefore, H3 is supported.

Insert Table 8 about here

Finally, we consider the use of pre and post-implementation reviews. We had earlier argued that corporations with different goals for IT would emphasize different aspects of IT evaluation. To determine if such differences exist, we again used a one-way analysis of variance by focus type. As shown in Table 9, significant differences were found for each of the four IT evaluation techniques.

Insert Table 9 about here

Figure 4, which shows a graphical representation of the means for each evaluation technique for each of the four focus types, provides a clear indication that the use of pre and post implementation techniques is indeed a function of corporate goals for IT. Specifically, unfocused firms, representing firms without clear goals for IT, are the lowest users of both pre and post-implementation techniques, with one notable exception: executive reviews of large spending proposals. Considering that these firms only commit to IT when it is absolutely necessary, it is not unusual to find that executives are heavily involved in deciding whether or not to proceed with a particular IT investment. At the other extreme, dual-focus firms make extensive use of both pre and post-implementation techniques. Operations-focus firms make more frequent use of pre-implementation techniques than market-focus firms, perhaps indicating that it is more difficult to evaluate IT investments in strategic positioning than in operational effectiveness. Collectively, these findings provide support for H4, confirming that firms with more focused goals for IT make greater use of IT evaluation techniques.

⁵ Chan et al. [11] found a similar relationship between strategic alignment and four specific measures of IT payoffs. Although these four items represented measures of IS effectiveness (IS contribution to efficiency, management effectiveness, establishment of market links and the enhancement of products and services), they clearly represent distinct areas of value within the value chain.

Insert Figure 4 about here

According to researchers, IT evaluation represents one of several mechanisms that corporations use to achieve strategic alignment [54]. To determine support for this hypothesis, we examined partial correlations between IT evaluation and strategic alignment, controlling for corporate goals for IT. As shown in Table 10, even with the effects of goals for IT removed, there is still a positive and significant correlation between strategic alignment and the four IT evaluation techniques.

Insert Table 10 about here

If, as this result suggests, strategic alignment is positively related to IT evaluation, then the benefits from more widespread use of IT evaluation have general applicability independent of goals for IT. For example, even in extreme cases such as unfocused firms without clear goals for IT, there is still a possibility that greater use of IT evaluation techniques could result in improved levels of strategic alignment, which in turn could lead to higher payoffs from IT. Therefore, H5 is supported.

The contrast between the use of pre and post-implementation techniques in Figure 4 suggests that most firms invest in IT based on an initial IT evaluation or plan, but are then unlikely to revisit those plans later to determine if the IT investment is actually performing according to plan. Indeed, Lee Iacocca once remarked “we invest in the computers and in training personnel . . . but we never go back and check on whether we saved ourselves even one person . . . I’ve signed so many projects that by now I should have nobody left” (25, p. 239). We therefore ask if post-implementation reviews will contribute to higher levels of IT business value than pre-implementation reviews alone.

In order to contrast the impact of pre and post-implementation reviews on IT business value, we computed partial correlations between the four IT evaluation techniques and the six different process measures of IT business value, controlling for goals for IT. As shown in Table 11, the partial correlations for both post-implementation techniques are highly significant, whereas the correlations for the pre-implementation techniques are indistinguishable from zero. Therefore, H6 is supported.

Insert Table 11 about here

This is a particularly interesting result for several reasons. First, it appears that after controlling for the effects of goals for IT, pre-implementation techniques have virtually no association with process-level IT payoffs. We interpret this to mean that based on corporations' existing use of pre-implementation techniques – which as shown in Figure 4 is already high – they are unlikely to benefit further from greater use of these techniques. Instead, greater use of post-implementation techniques is more likely to bolster IT payoffs. Therefore, in terms of where marginal efforts should be expended, the most obvious choice is in post-implementation reviews. Second, firms that use post-implementation reviews are in an ideal position to bring “best practice” or lessons learned from these reviews to bear on future IT investment decisions.

Discussion and Managerial Implications

It is important to summarize the main findings from this research before considering some of their implications. First, we found that business executives in corporations have very different goals for IT meaning that the context or environment in which IT operates is a key factor that should be considered by IS researchers investigating IT payoffs. In that sense, failure to control for goals for IT is tantamount to assuming that all corporations are homogeneous with respect to strategic intent for IT – clearly an erroneous assumption according to our findings.

Second, we found that by analyzing the differences in corporate goals for IT, we could classify firms into four distinct focus types: *unfocused*, *operations-focus*, *market-focus* and *dual-focus*. We consider these four focus type or perspectives to be important since it is likely that goals for IT influence a firm's IT investments, and consequently, the extent to which these investments will contribute to firm performance.

Third, we found that the level of perceived payoffs from IT is directly related to corporate goals for IT. Notably, executives in dual-focus firms perceive the highest level of payoffs from IT investments,

followed by market-focus, operations-focus and finally, unfocused firms. This hierarchy or ordering is maintained across the entire breadth of the value chain.

Fourth, we found that the primary locus of IT payoffs is consistent with corporate goals for IT. For example, executives in operations-focus firms perceive their most significant payoffs from IT in production and operations – activities that are central to using IT for operational effectiveness. Similarly, executives in market-focus firms perceive their highest IT payoffs in customer relations, which is again consistent with their goal of using IT to enhance strategic positioning. Furthermore, executives in dual-focus firms perceive their highest IT payoffs at two points, production and operations and customer relations, again consistent with their combined strategic focus.

Finally, we found that specific management practices (strategic alignment and IT evaluation) are strongly associated with perceived payoffs from IT investments. In particular, firms whose IT was closely aligned with the business strategy had higher perceived payoffs from IT while in firms where strategic alignment was weak, perceived IT payoffs were significantly lower. We also found a relationship between IT evaluation and perceived IT payoffs where firms that make extensive use of IT evaluation techniques or post-implementation reviews in particular, had higher perceived payoffs from IT. We also found that IT evaluation techniques can help firms to improve strategic alignment, which in turn can contribute to higher IT payoffs. At the heart of this finding is a fundamental argument that management practices such as post-implementation reviews extend and enhance the ability of the IT organization to learn from its mistakes and to adopt practices which have proven successful in the past. This capacity for learning is key to the discovery of best practices for managing IT investments [52].

Managerial Implications: These findings have implications for both IS and business executives. The fact that business executives have different goals for IT means that communication between business and IS executives is necessary to ensure that these goals are fully understood and acted upon. This is fully consistent with research that advocates involving business executives in IS planning [6], or creating a sense of shared IT vision and mutual recognition of business and IS objectives as a way to improve

strategic alignment [47]. Alternatively, if business and IS executives maintain diverging goals for IT, there is less likelihood that IT investments will benefit the firm. In light of the recent interest in enterprise systems and electronic commerce, the need for closer communication between business and IS executives is especially important for the successful implementation of future IT investments. Clearly, as business executives exercise greater authority and control over IT, their general attitudes towards IT will have an impact on the scale and direction of future IT investment decisions, with downstream implications for IT management practices and eventually IT payoffs.

More broadly, this research indicates that business executives can articulate their goals for IT, and can identify areas within the corporation where IT is creating value. This heightened sense of awareness of how IT can change the fortunes of the corporation points to a genre of business executives who view IT as a valuable business resource to be managed, rather than an overhead expense to be minimized. Yet for business executives who lack clear goals for IT or who seek to minimize or contain IT spending, this research demonstrates that by defining goals for IT that better support the business strategy, they too can expect to realize higher IT payoffs. Thus, rather than being dragged forward reluctantly by competitive necessity, executives in unfocused firms can define goals for IT and direct IT investments to critical areas within the business in order to better manage their existing IT resources.

Finally, business executives should recognize that IT investments must be managed just like any other capital investment. While increased IT spending might be necessary for greater IT business value, it is far from being sufficient. There are clear advantages from adopting IT management practices that ensure a closer alignment between IT and the goals of the business. The pursuit of strategic alignment is not the sole responsibility of the IS function. Indeed, business executives should feel empowered to get involved in IT investment decisions, since they as the main clients of the IS function will be the ones who benefit most from being able to direct IT resources to better support the business strategy.

Conclusion

This paper makes a number of contributions to the literature on IT business value. Our decision to focus on process-level measures was a direct response to calls for a more inclusive and comprehensive approach to measuring IT business value. Using the value chain to represent the different business processes, we constructed a comprehensive list of survey items to assess the perceived impacts of IT on a set of key business activities at the core of a firm's value system.

Our research also supports the use of executives' perceptions in evaluating IT investment payoffs, though only in the sense that perceptions are a proxy for objective measures of realized IT business value. Contrary to media reports that executives are dissatisfied with IT, this study finds that executives are, with some exceptions, satisfied that their current level of IT spending will help them to achieve their business goals. Furthermore, the goals that these executives espouse for IT investments influences their choice of management practices, which in turn influences the level of perceived IT payoffs. When there are clear goals for IT investment, there is evidence to suggest that IT is positively impacting firm performance at multiple points along the value chain.

Management practices play a central role in creating IT business value, helping to turn strategic intent for IT into position payoffs for the business. For example, our findings suggest that when firms make greater use of post-implementation reviews, executives will perceive higher levels of IT business value. This serves as a clear indication of the benefits that flow from being able to compare the impacts of a specific IT investment against a set of underlying objectives with the possibility of introducing corrective action if necessary. In that sense, the link between strategic alignment and IT payoffs is particularly important, considering that strategic alignment continues to be ranked as the most important issue facing business and IS executives. As corporations strive to realize greater payoffs from IT investments, in the short term this could be achieved through greater strategic alignment, reinforcing the need to specify clear and definitive goals for IT. In the longer term, corporations could consider moving

towards more strategic or focused goals for IT, where as shown earlier in Figure 3, IT payoffs can be considerably higher.

Research Limitations and Areas for Further Research: Although our research uses multiple process-oriented measures of IT business value, we only use a single firm-level measure of strategic alignment. In a future study, we plan to use multiple process-oriented measures of strategic alignment and other management practices in order to better assess the link between management practices and IT business value at the process-level. In addition, a possible limitation of this research is the use of a single respondent in each company. Although previous versions of this research found that multiple respondents were consistent in their evaluation of IT payoffs (implying no significant within-firm differences), the use of multiple respondents is still preferred.

The need to somehow capture or better represent the intangible benefits of IT, is an important challenge for IS researchers. Perceptual measures do not exist in a vacuum in the sense that behind many of the perceptual measures on our survey instrument, stands an array of objective firm-specific measures. Consequently, in order to validate executives' perceptions as a means of providing an accurate assessment of the true underlying payoffs from IT investment, there should be some attempt to correlate perceptual measures with traditional objective (financial and economic) measures.

Finally, as the strategic impacts of IT in areas such as product and service innovation and customer relations become more important, the need to evaluate these impacts will become a top priority for both IS researchers and practitioners. While this paper provides some general insights into how such an evaluation might proceed, there is a growing need for additional research in this area. We encourage researchers to extend our research on executive perceptions in a way that allows organizations to more easily evaluate the intangible return on IT investments.

References

1. Bakos, J.Y., and Treacy, M.E. Information Technology and Corporate Strategy. *MIS Quarterly*, 10, 2 (1986), 107–119.
2. Banker, R.D., and Kauffman, R.J. Quantifying the Business Value of Information Technology: An Illustration of the ‘Business Value Linkage’ Framework. *Working Paper, Stern School of Business, New York University*, 1991.
3. Barua, A.; Kriebel, C.H.; and Mukhopadhyay, T. Information Technologies and Business Value: An Analytic and Empirical Investigation. *Information Systems Research*, 6, 1 (1995), 3–23.
4. Bollen, K.A. *Structural Equations with Latent Variables*. New York, NY: Wiley, 1989.
5. Boynton, A.C.; Zmud, R.W.; and Jacobs, G.C. The Influence of IT Management Practice on IT Use in Large Organizations. *MIS Quarterly*, 18, 3 (1994), 299–318.
6. Broadbent, M., and Weill, P. Improving Business and Information Strategy Alignment: Learning from the Banking Industry. *IBM Systems Journal*, 32, 1 (1993), 162–179.
7. Brynjolfsson, E. The Productivity Paradox of Information Technology. *Communications of the ACM*, 35, 12 (1993), 66–77.
8. Brynjolfsson, E., and Hitt, L. Information Technology as a Factor of Production: The Role of Differences among Firms. *Economics of Innovation and New Technology*, 3, 4 (1995), 183–200.
9. Brynjolfsson, E., and Hitt, L. Paradox Lost? Firm-Level Evidence on the Returns to Information Systems Spending. *Management Science*, 42, 4 (1996), 541–558.
10. Busch, E.A.; Jarvenpaa, S.L.; Tractinsky, N.; and Glick, W.H. External versus Internal Perspectives in Determining a Firm’s Progressive Use of Information Technology. *Proceedings of the Twelfth International Conference on Information Systems*. New York, 1991, 239–250.
11. Chan, Y.E.; Huff, S.L.; Barclay, D.W.; and Copeland, D.G. Business Strategy Orientation, Information Systems Orientation and Strategic Alignment. *Information Systems Research*, 8, 2 (1997), 125–150.
12. Compass Group. *International IT Survey Census*. Rotterdam, The Netherlands: Compass Publishing BV, 1999.
13. Computer Sciences Corporation. *Critical Issues in Information Systems Management*, 1998.
14. Crowston, K., and Treacy, M.E. Assessing the Impacts of Information Technology on Enterprise Level Performance. *Proceedings of the Seventh International Conference on Information Systems*. San Diego, 1986, 377–388.
15. Davis, G.B., and Olson, M.H. *Management Information Systems*. New York, NY: McGraw-Hill, 1985.
16. DeLone, W.H., and McLean, E. R. Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research*, 3, 1 (1992), 60–95.
17. Dewan, S., and Min, C. The Substitution of Information Technology for Other Factors of Production: A Firm Level Analysis. *Management Science*, 43, 12 (1997), 1660–1675.
18. Earl, M. *Management Strategies for Information Technology*. London: Prentice Hall, 1989.
19. Economist Intelligence Unit (EIU). *Assessing the Strategic Value of Information Technology*. New York, NY: EIU, 1999.
20. Grover, V.; Teng, J.; Segars, A.H.; and Fiedler, K. The Influence of Information technology Diffusion and Business Process Change on Perceived Productivity: The IS Executive’s Perspective. *Information and Management*, 34, 3 (1998), 141–159.

21. Henderson, J.C., and Venkatraman, N. Strategic Alignment: Leveraging Information Technology for Transforming Organizations. *IBM Systems Journal*, 32, 1 (1993), 4–16.
22. Hitt, L., and Brynjolfsson, E. Information Technology and Internal Firm Organization: An Exploratory Analysis. *Journal of Management Information Systems*, 14, 2 (1997), 81–101.
23. Hitt, L., and Brynjolfsson, E. Beyond Computation: Information Technology, Organizational Transformation and Business Performance. *Working Paper, The Wharton School*, 1998.
24. Gurbaxani, V., and Whang, S. The Impacts of Information Technology on Organizations and Markets. *Communications of the ACM*, 34, 1 (1991), 59–73.
25. Iacocca, L. *Talking Straight*. New York, NY: Bantam Books, 1988.
26. Ives, B., and Learmonth, G.P. The Information System as a Competitive Weapon. *Communications of the ACM*, 27, 12 (1984), 1193–1201.
27. Ives, B., and Mason, R. Can Information Technology Revitalize Your Customer Service? *Academy of Management Executive*, 4, 4 (1990), 52–69.
28. Jarvenpaa, S.L., and Ives, B. Executive Involvement and Participation in the Management of IT. *MIS Quarterly*, 15, 2 (1991), 205–227.
29. Kauffman, R.J., and Kriebel, C.H. Modeling and Measuring the Business Value of Information Technologies. In P. Strassmann; P. Berger; B. Swanson; C. Kriebel; and R. Kauffman (eds), *Measuring the Business Value of IT*. Washington, DC: ICIT Press, 1988.
30. Kelley, M.R. Productivity and Information Technology: The Elusive Connection. *Management Science*, 40, 11 (1994), 1406–1425.
31. Lawrence, P.R., and Lorsch, J.W. *Organization and Environment: Managing Differentiation and Integration*. Boston, MA: Harvard Business School Press, 1986.
32. Lichtenberg, F.R. The Output Contributions of Computer Equipment and Personnel: A Firm-Level Analysis. *Economic Innovations and New Technology*, 3 (1995), 201–217.
33. Lucas, H.C. *Information Technology and the Productivity Paradox: Assessing the Value of Investing in IT*. New York, NY: Oxford University Press, 1999.
34. Luftman, J. Applying the Strategic Alignment Model. In J. Luftman (ed), *Competing in the Information Age: Strategic Alignment in Practice*. New York, NY: Oxford University Press, 1996.
35. McFarlan, W. Information Technology Changes the Way You Compete. *Harvard Business Review*, 62, 3 (1984), 98–103.
36. Mahmood, M.A., and Soon, S. K. A Comprehensive Model for Measuring the Potential Impact of Information Technology on Organizational Strategic Variables. *Decision Sciences*, 22, 4 (1991), 869–897.
37. Malone, T.W. Modeling Coordination in Organizations and Markets. *Management Science*, 33, 10 (1987), 1317–1332.
38. Mooney, J.G.; Gurbaxani, V.; and Kraemer, K.L. A Process-Oriented Framework for Assessing the Business Value of Information Technology. *Proceedings of the Sixteenth International Conference on Information Systems*. Amsterdam, 1995, 17–27.
39. Mukhopadhyay, T.; Kekre, S.; and Kalathur, S. Business Value of Information Technology: A Study of Electronic Data Interchange. *MIS Quarterly*, 19, 2 (1995), 137–156.
40. Pennings, J.M., and Buitendam, A. *New Technology as Organizational Innovation*. Cambridge, MA: Ballinger Publishing Company, 1987.
41. Pine, B.J.; Peppers, D.; and Rogers, M. Do You Want to Keep Your Customer Forever? *Harvard Business Review*, 73, 2 (1995), 103–108.

42. Porter, M.E. *Competitive Advantage*. New York, NY: Free Press, 1985.
43. Porter, M.E. What is Strategy? *Harvard Business Review*, 74, 6 (1996), 61–77.
44. Porter, M.E., and Millar, V.E. How Information Gives You Competitive Advantage. *Harvard Business Review*, 63, 4 (1985), 149–160.
45. Premkumar, G., and King, W.R. An Empirical Assessment of Information Systems Planning and the Role of Information Systems in Organizations. *Journal of Management Information Systems*, 9, 2 (1992), 99–125.
46. Raghunathan, B., and Raghunathan, T.S. Planning Implications of the Information Systems Strategic Grid: An Empirical Investigation. *Decision Sciences*, 21, 2 (1990), 287–300.
47. Reich, B.H., and Benbasat, I. Measuring the Linkage Between Business and Information Technology Objectives. *MIS Quarterly*, 20, 1 (1996), 55–81.
48. Rockart, J.F., and Flannery, L.S. The Management of End User Computing. *Communications of the ACM*, 26, 10 (1983), 776–784.
49. Sethi, V., and Carraher, S. Developing Measures for Assessing the Organizational Impact of Information Technology: A Comment on Mahmood and Soon's Paper. *Decisions Sciences*, 24, 4 (1993), 867–877.
50. Sethi, V., and King, W.R. Development of Measures to Assess the Extent to Which an Information Technology Application Provides Competitive Advantage. *Management Science*, 40, 12 (1994), 1601–1627.
51. Stabell, C., and Fjeldstad, Ø. Configuring Value for Competitive Advantage: On Chains, Shops and Networks. *Strategic Management Journal*, 19, 5 (1998), 413–437.
52. Strassmann, P. A. *The Squandered Computer: Evaluating the Business Alignment of Information Technologies*. New Canaan, CT: Information Economics Press, 1997.
53. Tallon, P.; Gurbaxani, V.; and Kraemer, K.L. Fact or Fiction: The Reality Behind Executive Perceptions of IT Business Value. *Working Paper, University of California, Irvine*, 1998.
54. Venkatraman, N.; Henderson, J.C.; and Oldach, S.H. Continuous Strategic Alignment: Exploiting IT Capabilities for Competitive Success. *European Management Journal*, 11, 2 (1993), 139–149.
55. Venkatraman, N., and Ramanujam, V. Measurement of Business Economic Performance: An examination of Method Convergence. *Journal of Management*, 13, 1 (1987), 109–122.
56. Violino, R. Measuring Value: Return on Investment. *Information Week*, June 30, 1997, 36–44.
57. Watson, R. T. Influences on the IS Manager's Perceptions of Key Issues: Information Scanning and the Relationship with the CEO. *MIS Quarterly*, 14, 2 (1990), 217–231.
58. Woolfe, R. The Path to Strategic Alignment. *Information Strategy: The Executive's Journal*, 9, 2 (1993), 13–23.
59. Wilson, D. Assessing the Impact of Information Technology on Organizational Performance. In R.D. Banker; R.J. Kauffman; and M.A. Mahmood (eds), *Strategic Information Technology Management: Perspectives on Organizational Growth and Competitive Advantage*. Harrisburg, PA: Idea Group Publishing, 1993.

APPENDIX: IT Business Value Questionnaire

Current Goals for IT investments

What are your current goals for IT? Please evaluate the following statements.

In our organization . . .

- IT should reduce our costs and increase quality and speed
- IT should enhance the effectiveness of our overall performance
- IT should extend our market and geographic reach
- IT should help us to change industry and market practices

Do not agree Agree Completely
1 2 3 4 5 6 7

Management Practices

Strategic Alignment

Does the IT strategy support your business strategy?

No Support Strong Support
1 2 3 4 5 6 7

IT Evaluation

What processes do senior managers use to evaluate major IT investments?

Pre-Implementation

- Executive management reviews of large spending proposals
- Justification before purchase

Post-Implementation

- Formal reviews after implementation
- Regular reviews by business units

Never used Use is mandatory
1 2 3 4 5 6 7

IT Business Value

How does IT boost company performance in the following areas? Restrict your appraisal to value already realized rather than value expected in the future.

Does Information Technology . . .

Low Impact High Impact
1 2 3 4 5 6 7

Process Planning and Support

- PPS1 Improve internal communication and coordination
- PPS2 Strengthen strategic planning
- PPS3 Enable your company to adopt new organizational structures
- PPS4 Improve management decision making
- PPS5 Streamline business processes

Supplier Relations (Inbound Logistics)

- SR1 Help your corporation gain leverage over its suppliers
- SR2 Help reduce variance in supplier lead times
- SR3 Help develop close relationships with suppliers
- SR4 Improve monitoring of the quality of products / services from suppliers
- SR5 Enable electronic transactions with suppliers

Production & Operations

- PO1 Improve production throughput or service volumes
- PO2 Enhance operating flexibility
- PO3 Improve the productivity of labor
- PO4 Enhance utilization of equipment
- PO5 Reduce cost of tailoring products or services

Table 1. Dimensions of IT Business Value: A Review of the Research Literature

<p><u>Process Planning and Support</u></p> <p>IT improves planning and decision making by improving organizational communication and coordination and by enhancing organizational flexibility [1].</p>
<p><u>Supplier Relations (Inbound Logistics)</u></p> <p>Use IT to coordinate supplier linkages and reduce search costs [35].</p> <p>IT can improve communication (EDI), quality control (TQM) and delivery techniques (EDI/JIT), leading to competitive advantage [39].</p>
<p><u>Production & Operations</u></p> <p>Use IT to deliver enhanced manufacturing techniques through computer-aided design [30].</p> <p>Improvements in the production process can lead to economies of scale in the delivery of products and services [2, 37, 42].</p> <p>Incorporating IT into the end product [26, 44], and the use of advanced manufacturing processes can enable a greater range of products and services [40].</p>
<p><u>Product & Service Enhancement</u></p> <p>IT can be used in the development of new products and services [3].</p> <p>IT can enable products and services to be uniquely differentiated in a variety of ways [1].</p>
<p><u>Sales & Marketing Support</u></p> <p>The development of new products and services can enable an organization to identify and serve new market segments [41].</p> <p>IT can be used to track market trends and responses to marketing programs [44].</p>
<p><u>Customer Relations (Outbound Logistics)</u></p> <p>IT can be used to establish, sustain and improve relationships with customers [26].</p> <p>Improving customer relations can result in improved market share [42].</p>

Table 2. Linking Business Strategy with Corporate Goals for IT

Business Strategy	Goals for IT
<i>Operational Effectiveness</i>	<i>Internal</i>
Efficiency	Reduce costs, increase productivity and speed
Effectiveness	Enhance overall organizational effectiveness
<i>Strategic Positioning</i>	<i>External</i>
Reach	Extend existing market and geographic reach
Structure	Change industry or market practices

Table 3. Characteristics of the Sample (N=304)

Variable	Frequency	Percent
<i>Location</i>		
North America	183	60.2
Europe	78	25.7
Asia	43	14.1
<i>Revenues (1997)</i>		
Less than \$500m	112	36.8
\$500m – \$1b	41	13.5
\$1b – \$5b	67	22.1
\$5b – \$10b	39	12.8
More than \$10b	45	14.8
<i>Industry Group</i>		
Manufacturing	128	42.1
Wholesale / Retail Trade	39	12.8
Telecommunications / Utilities	19	6.3
Finance, Insurance & Real Estate	52	17.1
Business & Professional Services	66	21.7
<i>Respondents</i>		
CEO	38	12.5
CFO	37	12.2
Vice President	86	28.3
Director	85	28.0
Senior Manager	43	14.1
Other	15	4.9

Table 4. Discriminant Analysis on Goals for IT

Focus Type	Actual	Discriminant Analysis				
		Predicted	Correct		Incorrect	
Unfocused	48	47	39	(81.3%)	8	(18.7%)
Operations-focus	138	139	122	(88.4%)	17	(11.6%)
Market-focus	25	14	11	(44.0%)	3	(56.0%)
Dual-focus	93	104	86	(92.5%)	18	(7.5%)
Total	304	304	258	(84.9%)	46	(15.1%)

Table 5. Factor Analysis and Reliability Measures

Variables	# Items	Eigenvalue	Cumulative Var.	Reliability
<i>IT Business Value</i>				
Customer Relations	5	13.545	45.2%	0.9106
Suppliers Relations	5	2.201	52.6%	0.8978
Sales and Marketing	5	1.876	58.8%	0.9017
Production / Operations	5	1.570	64.0%	0.8799
Product / Service Enhancement	5	1.175	67.9%	0.8963
Process Planning and Support	5	1.013	71.3%	0.8274
<i>IT Evaluation</i>				
Post-implementation	2	2.169	54.2%	0.7815
Pre-implementation	2	1.115	88.1%	0.7774

Table 6. Analysis of IT Business Value by Focus Type (Hypothesis 1)

Business Activity	Focus Type	Mean	S.D.	F	Significance
Process Planning and Support	Unfocused	4.09	1.42	11.108	.000
	Operations	4.43	0.97		
	Market	4.80	0.99		
	Dual	5.10	1.14		
Supplier Relations	Unfocused	3.30	1.30	8.834	.000
	Operations	3.51	1.36		
	Market	3.84	1.59		
	Dual	4.36	1.46		
Production and Operations	Unfocused	3.88	1.22	10.874	.000
	Operations	4.42	1.25		
	Market	4.58	0.98		
	Dual	5.06	1.20		
Product and Service Enhancement	Unfocused	3.54	1.42	15.047	.000
	Operations	3.82	1.38		
	Market	4.56	0.84		
	Dual	4.85	1.39		
Sales and Marketing	Unfocused	3.47	1.39	10.917	.000
	Operations	3.76	1.38		
	Market	4.23	1.08		
	Dual	4.65	1.45		
Customer Relations	Unfocused	3.93	1.42	14.594	.000
	Operations	4.13	1.40		
	Market	4.88	0.90		
	Dual	5.13	1.16		

Table 7. Analysis of Strategic Alignment by Focus Type (Hypothesis 2)

Variable	Focus Type	Mean	S.D.	F	Significance
Strategic Alignment	Unfocused	4.44	1.49	7.654	.000
	Operations	5.03	1.24		
	Market	5.36	0.99		
	Dual	5.47	1.21		

Table 8. Strategic Alignment and IT Business Value (Hypothesis 3)

	<i>Critical Business Activities / Business Processes</i>					
	Process Plan. & Support	Supplier Relations	Production / Operations	Product / Service Enhancement	Sales & Marketing	Customer Relations
Strategic Alignment	0.318***	0.145***	0.297***	0.265***	0.179***	0.238***

*** Significance ($p < 0.001$). Partial correlations controlling for goals for IT.

Table 9. Analysis of IT Evaluation by Focus Type (Hypothesis 4)

	Variable	Focus Type	Mean	S.D.	F	Significance
Pre-Implementation	Executive Reviews of Large Spending Proposals	Unfocused	5.58	1.57	6.228	.000
		Operations	6.12	1.39		
		Market	5.32	1.77		
		Dual	6.41	1.16		
	Justification before Purchase	Unfocused	5.27	1.48	6.404	.000
		Operations	5.80	1.37		
		Market	5.55	1.58		
		Dual	6.25	1.02		
Post-Implementation	Formal Reviews after Implementation	Unfocused	3.85	1.49	8.507	.000
		Operations	4.19	1.75		
		Market	4.44	1.70		
		Dual	5.12	1.53		
	Regular Reviews by Business Units	Unfocused	3.94	1.42	6.342	.000
		Operations	4.26	1.76		
		Market	4.60	1.66		
		Dual	5.05	1.56		

Table 10. Strategic Alignment and IT Evaluation (Hypothesis 5)

	<i><u>Pre-Implementation</u></i>		<i><u>Post-Implementation</u></i>	
	Executive Reviews of Large Spending Proposals	Justification Before Purchase	Formal Reviews after Implementation	Regular Reviews by Business Units
Strategic Alignment	0.1548***	0.1709***	0.2253***	0.2570***

*** Significance ($p < 0.001$). Partial correlations controlling for goals for IT.

Table 11. IT Evaluation and IT Business Value (Hypothesis 6)

Critical Business Activities	<i>Pre-Implementation</i>		<i>Post-Implementation</i>	
	Executive Reviews of Large Spending Proposals	Justification Before Purchase	Formal Reviews after Implementation	Regular Reviews by Business Units
Process Planning and Support	0.0122	0.0436	0.2263***	0.2791***
Supplier Relations	0.0733	0.0617	0.1778***	0.2034***
Production and Operations	0.0440	0.616	0.1926***	0.2841***
Product / Service Enhancement	-0.0512	0.0130	0.1787***	0.2460***
Sales and Marketing	0.0037	-0.0477	0.1846***	0.2768***
Customer Relations	-0.169	-0.0645	0.1630***	0.1996***

*** Significance ($p < 0.001$). Partial correlations controlling for goals for IT.

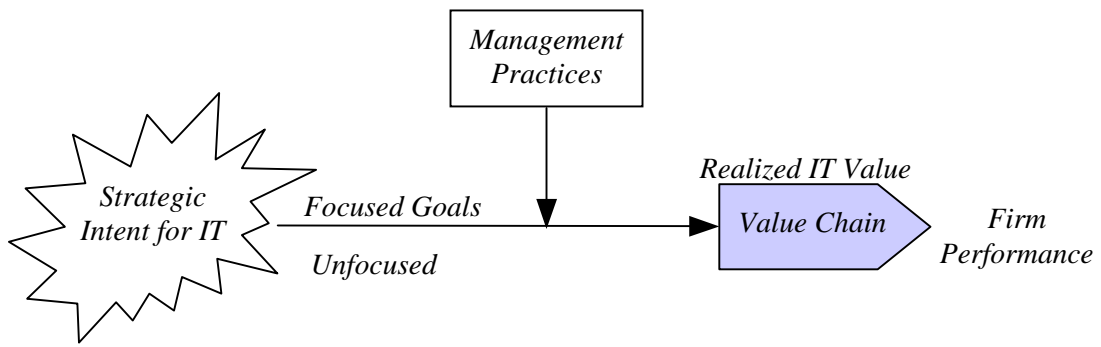


Figure 1. Conceptual Model of IT Business Value

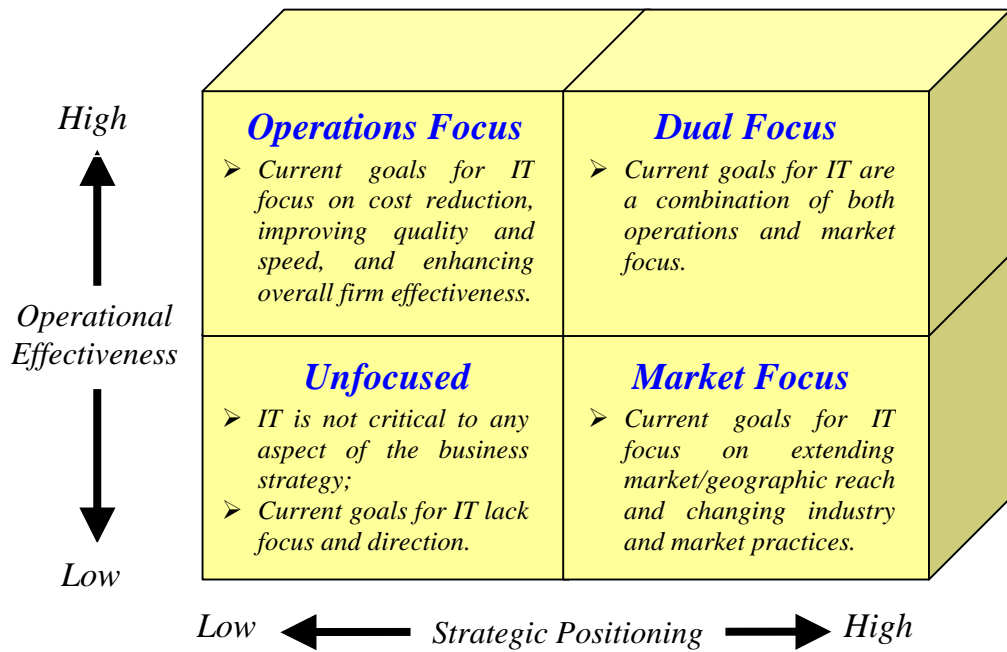


Figure 2. Corporate Goals for IT

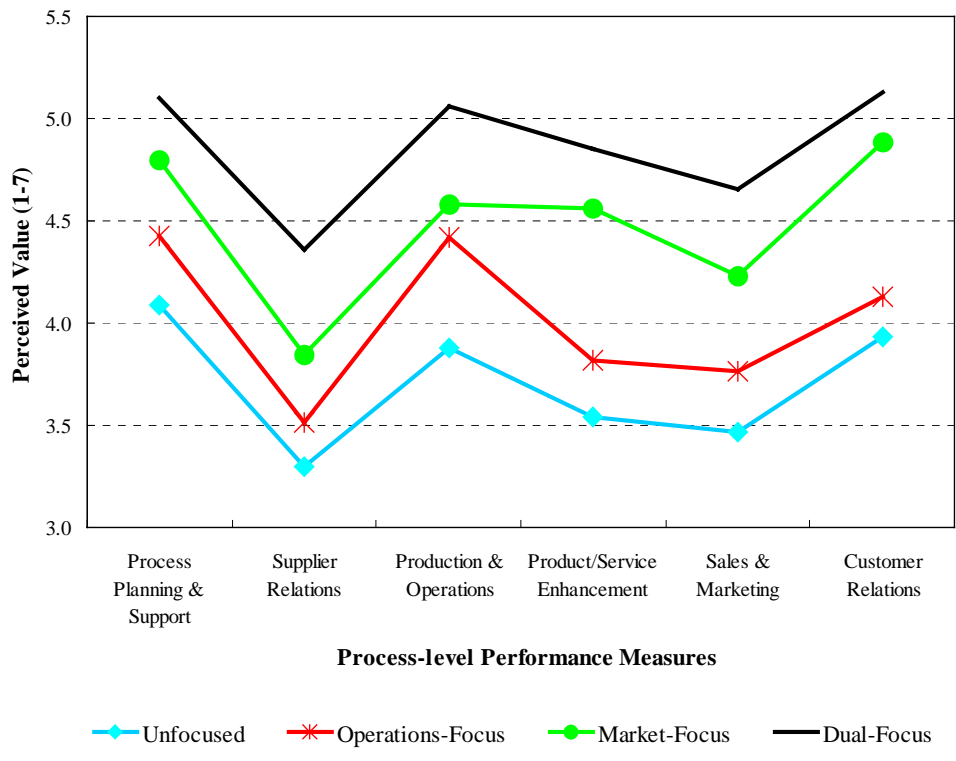


Figure 3. Perceived IT Business Value

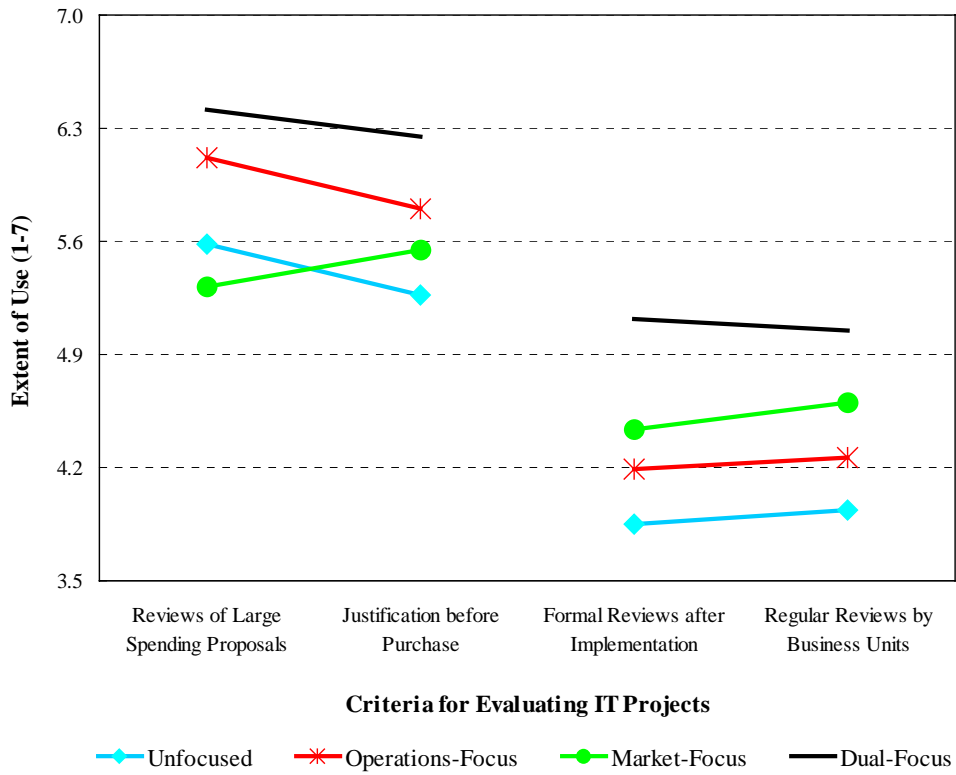


Figure 4. Use of IT Evaluation Techniques

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