Information technology (IT) investment and the role of a firm: an exploratory study

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Abstract

This study extends Weill's (\textit{Do computers pay off? A study of information technology investments and manufacturing performance}. Washington, DC: International Center for Information Technologies, Information Systems Research, 3(4), 307–333) work by categorizing IT investment into four types of management objectives: transactional, strategic, informational and threshold. The relationships between these management objectives and firm's role (defined in terms of traditional, evolving and strategic) are investigated through a questionnaire survey of managers in the service sector. As expected, firms adopting a traditional role seem to favor investment in transactional IT. However, there appears to be an increasing emphasis on strategic IT investment for all three types of firms, regardless of the role of IT. Implications of the results are discussed. © 2000 Elsevier Science Ltd. All rights reserved.

Keywords: Information technology; IT investment; Management objectives; IT performance

1. Introduction

Large amounts of resources have been and will continue to be invested in information technology (IT). However, what exactly is the impact of IT on firm’s performance? Empirical results are generally inconclusive, with some studies showing positive relationship (e.g., Brynjolfsson & Hitt, 1996; Harris & Katz, 1991) while others show negative or no relationship (e.g., Berndt & Morrison, 1994; Loveman, 1994) between IT investment and firm performance.
One reason for the productivity paradox of IT investment lies in how IT investment is being defined. According to Weill (1990, 1992), IT is not a homogeneous entity; therefore, total IT investment is too broad a construct to be useful when analyzing its associations with firm performance. Most IT investment research do not distinguish among the different types of IT, with respect to performance effects. Assumption of IT homogeneity could create misleading results on the impact of IT since different systems exist for different management objectives.

Hence, Weill’s categorization of IT investment into three components — each for a different purpose — is critical to finding any association with performance. The three types of IT investment are namely transactional, strategic and informational. Transactional IT aims at cutting costs. Strategic IT aims to provide competitive advantage with respect to the firm’s competitors. It is used to generate sales and increase market share and thus improves the firm’s competitive position. Informational IT refers to information infrastructure to facilitate information access and communications.

However, as pointed out by Weill, the three types of IT will not be sufficient over the long term, and new categories will be necessary. A fourth type of IT investment (recommended by Weill), referred to as threshold IT, is included in this study. Threshold IT refers to investments made just to compete. Such investments are made to imitate competitors’ technology level and are often made regardless of whether it has a positive return.

Firms’ perspectives on the role of IT in their organizations may influence the allocation of the IT budget to the different management objectives (i.e., transactional, strategic, informational and threshold). This paper is an exploratory attempt to examine whether the role of IT an organization adopts, affects the relative proportions of the various types of IT investment. The role of IT can be defined in terms of Johnston and Carrico’s (1988) typology of traditional, evolving and strategic roles.

This study examines the relative proportions of Weill’s four types of IT investment in terms of Johnston and Carrico’s typology of the firm’s role of IT. In addition, the relative emphasis on the types of IT investment over three time frames (three years ago, presently, and three years later) are examined. This understanding of the relationships between the four types of IT investment and the three roles of IT should lead to more informed IT investment decisions, more realistic expectations of what IT investment can achieve, more effective evaluation of IT performance, and better utilization of IT as a tool for strategic management.

2. Literature review

Prior research can be divided into studies examining the relationship between IT investment and firm’s performance, and studies examining the role of IT.

2.1. Relationship between IT investment and firm performance

2.1.1. Negative relationship

Several studies made on the services sector have reported disappointing productivity of IT capital. For example, Roach (1988) reported that massive investments in IT have failed to boost national productivity growth. Roach cited statistics indicating that output per production worker
grew by 16.9% between mid-1970s and 1986, while output per information worker decreased by 6.6%.

In a study on the American manufacturing industries, Berndt and Morrison (1994) found that each dollar spent on high-tech capital (computers, instruments and telecommunications equipment) increased measured output by only 80% on the margin. There was a statistically significant negative relationship between productivity growth and the high-tech intensity of capital investments.

2.1.2. No relationship

Turner (1985) conducted a survey of 58 mutual savings banks and found no significant relationship existed between bank performance and IT investment. Similarly, Strassmann (1990) also reported disappointing evidence in several studies. In particular, he found that there is no correlation between IT and return on investment in a sample of 38 service sector firms. He concluded that there is no correlation between spending for computers, profits and productivity. Another study by Loveman (1994) also concluded that investments in IT showed no net contribution to total output. Using the Management of the Productivity of Information Technology (MPIT) database, most of the elasticity estimates of IT investments were not statistically distinguishable from zero.

Similarly, Strassmann (1997) examined the financial records of 66 US companies and found little evidence for any productivity improvement despite 10 years of computerization.

2.1.3. Positive (or mixed) relationship

Many studies have actually revealed mixed findings whereby only certain, if not all, elements of positive relationship between IT investment and firm performance were found. For the purpose of categorization, such studies are classified under this section.

Bender (1986) examined the insurance industry and concluded that total information processing expense was significantly related to the reduction of total operating expenses. In a study of primarily perceptual performance measures, Northrop, Kraemer, Dunkle and King (1990) studied the payoffs from computerization in government organizations and found that major payoffs occurred in the areas of availability of information, efficiency of operational performance and interaction with the public. Similarly, a study by Harris and Katz (1991) revealed that firm performance is linked to the level of IT investment intensity.

Weill (1992) also found positive relationship between IT investment and firm performance in the manufacturing sector. Findings revealed that heavy use of transactional IT investment was significantly and consistently associated with strong firm performance. Heavy use of strategic IT was found to be neutral in the long term and associated only with relatively poorly performing firms in the short term. Informational IT investment was found to have a neutral effect on performance.

Mahmood and Mann (1993) studied 85 organizations from Computerworld’s “Premier 100” list and concluded that strategic and economic measures, as a group, were significantly related to IT investment measures. Positive and significant relationships were found between certain investment measures and organizational performance. Similarly, Bharadwaj, Bharadwaj and Konsynski (1999) found evidence that IT investments had a positive association with Tobin’s q value (a financial market-based measure of firm performance).
In a similar vein, a study by Brynjolfsson and Hitt (1996) indicated that Information Systems (IS) spending has made a substantial and statistically significant contribution to firm output. The authors mentioned that the use of new, firm-level data which were more recent and detailed could have accounted for the sharply different results as compared to Brynjolfsson (1993) which describes the productivity paradox of IT. In another study, Brynjolfsson (1996) found that IT investments generate approximately three times their cost in value for consumers. Similarly, Hitt and Brynjolfsson (1996) showed that IT could increase productivity and create value for consumers, and yet fail to increase profits. Hence, the value of IT is often dependent on the measure used to assess it. Further, Brynjolfsson and Hitt (1998) emphasized that there is a need to move beyond the productivity paradox and focus on how IT can act as a catalyst for organizational changes.

In a non-US study, Tam (1998) examined the impact of IT investment on firm-level performance in four newly industrialized economies (NIEs). Although he found that IT investment was not correlated with shareholder’s value, the results were mixed for the impact of IT on return on equity (ROE), return on asset (ROA) and return on sales (ROS). In a similar vein, Dewan and Kraemer (1998) examined data from 17 developed countries and found evidence to suggest that developed countries are receiving positive and significant returns on their IT investments.

Local IT impact studies have also revealed positive findings. They include Poh (1993) whose case study of a manufacturing firm revealed improved performance ex-post the launch of its IT programme. Wong (1994) investigated the impact of IT investment on overall productivity in the Singapore economy by estimating an economy-wide Cobb Douglas production function that separates capital stock into an IT-component and a non-IT component. Results revealed a positive and significant coefficient for IT capital implying return on investment (ROI) that exceeded 88%. The estimation results thus appear to refute the productivity paradox in the case of Singapore.

Ng (1995) examined the productivity of the financial sector in Singapore using the standard Cobb–Douglas aggregate production function, and found that IT had a significant impact on output production, return on assets and return on sales. Similarly, Ng (1996) found that IT investment intensity has an impact on the business turnover per employee.

2.2. Role of information technology (IT)

The notion that the IT function serves different roles in different organizations and that such roles may evolve over time has been extensively discussed in past research. Lederer and Salmela (1996) considered the role of IT to be an important aspect of the firms’ internal environment that influences IS planning. Nolan (1979) proposed that the role of the IT function evolve through six stages of growth. Similarly, McFarlan, McKenney and Pyburn (1983) found that the role of IT varies in importance among different firms. Consequently, they proposed a strategic grid matrix that classifies firm according to the strategic impact of existing applications and new applications under development. Predictions of the strategic grid has been empirically tested by Raghunathan and Raghunathan (1990) who confirmed that there is a need to match IT planning characteristics with the role of IT in the organization. Similarly, Premkumar and King (1992) found that there are significant differences in planning, organizational support, and performance characteristics of IS planning among organizations with different roles of IT.

Another typology of the role of IT in relation to business strategy was proposed by Johnston and Carrico (1988) as encompassing three types: traditional, evolving and integral. This typology has
the advantage of simplicity and ease of operationalization compared to the strategic grid. Grover (1993) used the typology as one of the factors influencing customer-based interorganizational system (CIOS) and found that integral role of IT was positively related to CIOS adoption. Similarly, Teo, Tan and Wong (1997) also used Johnston and Carrico’s typology in their examination of factors influencing Internet adoption. They found that firms where IT is integral to business strategy are more likely to adopt the Internet compared to firms where IT plays an evolving or traditional, non-strategic role.

Related research has examined the role of the Chief Information Officer (CIO) (Applegate & Elam, 1992), the IS planning executive (Raghunathan & Raghunathan, 1989), and the IS Department (Janson, 1989). Other research has examined the role of IT in the context of business-IS planning integration (King & Teo, 1997) and IT management sophistication or IT maturity (Sabherwal & Kirs, 1994).

In summary, results on the relationship between IT investment and firm’s performance have generally been mixed, though recent evidence tend to show positive relationships. In reviewing past research, Weill (1992) commented that not all IT investment is alike and that the context of the firm is important for converting IT investments into productive outputs. Similarly, Li and Ye (1997) found that the impact of IT investments appear to be dependent on the firm’s contextual factors. In a similar vein, Rai, Patnayakuni and Patnayakuni (1997) emphasized that although IT is likely to improve organizational efficiency, its effect on administrative productivity and business performance might depend on the quality of management processes and IT-strategy links (which is related to the role of IT).

Hence, in this paper, we distinguish between different types of IT investment (transactional, strategic, informational and threshold) and use the role of IT (traditional, evolving and integral) as a surrogate for the context of the firm which may affect the relative proportion allotted to each type of IT investment.

3. Method

3.1. Sample and procedures

In collaboration with the National Computer Board (NCB), the Centre for Management of Innovation and Technopreneurship (CMIT), at the National University of Singapore (NUS) carried out a “Survey on the Performance Impact of IT in the Service Industry”. Participants were randomly selected from two service industry directories (Datapool, 1990; Singapore Trade Development Board, 1995). Mailed questionnaire method was used for its advantages of ease and economy.

Before the survey was officially administered, pretesting was conducted with five students and three practitioners. They were requested to complete the questionnaire and provide feedback on its content and format. At the same time, they were requested to check for any vagueness or ambiguity in the questionnaire. Generally, the questionnaire was well received and easily understood. Concerns were raised on the wordings of four types of IT investment. Subsequently, slight alterations were made to improve the clarity of the wordings.

A sample of 450 service companies was randomly selected. During the process of data collection, follow-up telephone calls were made to the respective companies who have not responded by the
due date. In the follow-up, faxing of questionnaires was done, instead of mailing, to facilitate respondents’ reply. Thirty companies declined participation, citing reasons such as confidentiality, busy schedules and lack of use of IT in their organizations. Sixty-five responses were collected, of which six were unusable. Usable responses therefore totalled 59 (14%). On an exploratory basis, telephone and/or face to-face interviews were conducted with respondents to supplement and gather feedback on the questionnaire data and results.

3.2. Instrument

Whenever possible, items measuring various constructs were derived from past research literature. A broad definition of IT, in accordance with that of Weill (1992), was adopted which includes all hardware, software, communications, telephone and facsimile as well as personnel and resources dedicated to IT, whether centralized or decentralized. In this study, the term ‘IS’ is used interchangeably with ‘IT’.

The questionnaire collected background information such as industry segment, job position, number of employees, number of IT staff, annual revenue and annual IT budget. In addition, the role of IT and the proportion of IT budget allotted to each type of management objectives were measured as follows:

Role of IT: The role of IT was adapted from Johnston and Carrico’s (1988) typology of how IT can be integrated with business strategy. This typology (rather than the McFarlan et al. strategic grid) was chosen due to its conceptual simplicity and relevance, and also because it has often been used successfully in past research (e.g., Grover, 1993). Furthermore, this typology explicitly links IT to business strategy. Type 1 or traditional companies focus IT efforts primarily on improving administrative and managerial information systems. Here, the role of IT is to support operations but is not strategy related. Type 2 or evolving companies define and develop strategies at the corporate and business unit level without explicitly considering the competitive potential of IT. Once strategies are defined, IS groups actively seek out opportunities to use IT to support the strategies. Type 3 or integrated companies display a more proactive orientation towards IT. There is a tight integration between strategy and IT. IT is integral to business strategy, whereby IS and business management work together to formulate organizational strategies. Respondents were asked to select the appropriate role of IT in their organizations.

IT investment: Respondents were asked to allocate the proportion of IT investment expenditure in terms of four different management objectives:

1. **Transactional** IT processes the transactions of the firm and IT investment of this type is usually aimed at cutting costs by substituting capital for labour.
2. **Strategic** IT investment is made to gain a competitive advantage and increase market share, via sales growth.
3. **Informational** IT investment facilitates information access and communication.
4. **Threshold** IT investment is made just to compete. Firms investing in threshold IT are not unduly concerned about whether the investment has a positive return. It is a necessity, regardless of the accounting rationale, in order to imitate competitors’ technology level.
Data for three time frames (3 years ago, present, 3 years later) were obtained in order to enable us to determine the trends in the four types of IT investment. The measures are shown in the appendix.

4. Results

4.1. Response rate

As reported earlier, the total number of usable responses is 59, thereby yielding a response rate of 14%. Data collection was difficult as a number of firms declined participation citing confidentiality and busy schedule as reasons. However, a check using chi-square statistics revealed no significant non-response bias in terms of the various sectors of the service industry.

4.2. Profile of respondents

Despite the small sample size, the various sectors of the service industry are relatively well represented with a dominance of financial firms, as shown in Table 1. The respondents have worked, on average, 5 years in the company and 10 years in the service industry. The majority of respondents hold management positions in their organizations.

Generally, the firms are small in terms of size, with the majority of the companies with less than 100 employees. The majority of firms also employ fewer than 50 IT staff and enjoy annual sales of less than $50 million in 1996. Companies surveyed generally allocated an annual IT budget of less than $1 million for the past three years (1994–1996).

4.3. IT investment trends

To recap, firms were asked to indicate the type of role IT plays in their organization. The three roles are traditional, evolving or integral. The firms were also asked to allocate their IT budget in terms of the percentage allocated to each of the four management objectives. The results show that the three different roles of IT are well represented by the sample respondents. Thirty-five percent of companies in the sample adopt a traditional view of the role of IT in their organizations whereby IT supports operations, decision-making and administrative functions, but is not strategy related. Thirty-six percent of companies felt that their role of IT is still evolving. Currently, IT supports business strategy in their organizations, but is not an integral part of the strategy formulation process. The remaining 29% of firms felt that IT plays an integral role in their organizations. In these firms, IT is integral to business strategy whereby IS and business management work together to formulate organizational strategies.

Figs. 1a–d provide a graphical depiction of the average proportion of IT budget allocated to the four types of IT investment (transactional, strategic, informational and threshold) for the three types of organizations (traditional, evolving and integral) over the three time frames (three years ago, present, and three years later). Due to the small sample size and the exploratory nature of this study, we did not attempt to carry out any statistical tests as we felt that it will not be meaningful.
Table 1
Respondents’ profile (N = 59)

<table>
<thead>
<tr>
<th>Respondents’ profile</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td><strong>Service industry</strong></td>
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<tr>
<td>Financial</td>
<td>30.5</td>
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<tr>
<td>Logistics</td>
<td>20.3</td>
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<tr>
<td>Hospitality</td>
<td>16.9</td>
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<tr>
<td>Retail</td>
<td>15.3</td>
</tr>
<tr>
<td>Business services</td>
<td>10.2</td>
</tr>
<tr>
<td>Diversified company</td>
<td>3.4</td>
</tr>
<tr>
<td>Communications</td>
<td>3.4</td>
</tr>
<tr>
<td><strong>Job position</strong></td>
<td></td>
</tr>
<tr>
<td>CEO/vice-president/managing director</td>
<td>13.6</td>
</tr>
<tr>
<td>General manager/non-IT manager</td>
<td>40.7</td>
</tr>
<tr>
<td>CIO/IT manager</td>
<td>22.0</td>
</tr>
<tr>
<td>Others</td>
<td>20.3</td>
</tr>
<tr>
<td>Missing data</td>
<td>3.4</td>
</tr>
<tr>
<td><strong>Number of employees</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; 100</td>
<td>47.5</td>
</tr>
<tr>
<td>101–200</td>
<td>18.6</td>
</tr>
<tr>
<td>201–500</td>
<td>11.9</td>
</tr>
<tr>
<td>501–1000</td>
<td>10.2</td>
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<tr>
<td>&gt; 1000</td>
<td>10.2</td>
</tr>
<tr>
<td>Missing data</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Number of IT staff</strong></td>
<td></td>
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<tr>
<td>&lt; 50</td>
<td>84.7</td>
</tr>
<tr>
<td>51–100</td>
<td>6.8</td>
</tr>
<tr>
<td>101–150</td>
<td>3.4</td>
</tr>
<tr>
<td>&gt; 150</td>
<td>1.7</td>
</tr>
<tr>
<td>Missing data</td>
<td>3.4</td>
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<tr>
<td><strong>Annual revenue (S$)</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; 10 million</td>
<td>22.0</td>
</tr>
<tr>
<td>11–50 million</td>
<td>23.7</td>
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<tr>
<td>51–100 million</td>
<td>13.6</td>
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<tr>
<td>101–250 million</td>
<td>18.6</td>
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<tr>
<td>&gt; 250 million</td>
<td>10.2</td>
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<tr>
<td>Missing data</td>
<td>11.9</td>
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<tr>
<td><strong>Average annual IT budget S$ (1994–1996)</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; 50,000</td>
<td>27.1</td>
</tr>
<tr>
<td>50,001–100,000</td>
<td>18.6</td>
</tr>
<tr>
<td>100,001–500,001</td>
<td>16.9</td>
</tr>
<tr>
<td>50,0001–1 million</td>
<td>18.6</td>
</tr>
<tr>
<td>1–2 million</td>
<td>10.2</td>
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<tr>
<td>&gt; 2 million</td>
<td>8.5</td>
</tr>
</tbody>
</table>
4.3.1. Transactional IT investment

Transactional IT is investment made to cut costs by substituting capital for labour. Fig. 1a shows the transactional IT investment trend for firms practising each of the three different roles of IT.

The proportion of IT budget allocated to transactional IT for firms adopting a traditional role of IT, is consistently higher than that of firms adopting an integral or evolving role. Generally,
firms with a traditional role of IT view IT as a tool to support operations, decision-making and administrative functions. Cost cutting is therefore a top priority. For the next three years, there appears to be an increase in transactional IT investment for firms with traditional role of IT. One likely reason is that these firms are actively investing in transactional IT to improve efficiency and cut costs. One Systems Development Manager commented:
Transactional IT will positively affect internal efficiency as costs are cut down. As the organization is driven by the bottomline, cutting down costs will contribute to profitability.

Systems Development Manager

On the other hand, in companies where IT plays an evolving or integral role, there appears to be a fairly constant proportion of IT budget allocated to transactional IT investment. Some minimal level of transactional investment appears to be necessary for all firms.

4.3.2. Strategic IT Investment

Strategic IT is investment made to gain competitive advantage and increase market share, via sales growth. In Fig. 1b, the strategic IT investment trend for firms practising each of the three different roles of IT is presented.

Fig. 1b shows an increasing trend of strategic IT investment, thereby indicating that the use of strategic IT is gaining momentum in the industry. Respondents generally agreed that strategic IT may possibly form the new basis of competition in the service industry. The following quotes support this notion:

Very possibly, strategic IT will form the new basis of competition in the service industry. There is a need to keep ahead of competition. Strategic thinking will help companies to compete, and maybe survive, in future where competition will be intensified.

Director of IT

I am not surprised that organizations will allocate more IT budget to re-engineer and bring in more businesses for the company. IT is becoming more and more integrated with the business strategy.
Therefore, more business thinking will be focused on using IT to attract customers, launch new products, change the way we do business, etc. Organizations with the right strategic weapon will win.

Systems Development Manager

It is not surprising to see firms with an integral outlook of IT as the leading users of strategic IT. One plausible explanation is that these firms realize the importance of partnership between IT and business in the formulation and implementation of business strategies. Thus, as expected, a higher proportion of strategic IT investment is consistently made.

Interestingly, firms which adopt either a traditional or evolving role of IT spent, on average, the same proportion on strategic IT investment presently and 3 years ago. However, for the next 3 years, firms whose IT role is evolving in nature, appears likely to increase their strategic IT investment ahead of their traditional counterparts. One likely reason is that these firms increasingly realize the need to leverage IT more effectively in supporting their business strategies.

4.3.3. Informational IT investment

Informational IT refers to information infrastructure (e.g. telephone, facsimile and e-mail systems) to facilitate information access and communication. Fig. 1c depicts the trend of informational IT investment for firms practising each of the three different roles of IT.

For the past three years, there seems to be a constant or slightly increasing trend of informational IT investment for all the companies adopting their respective roles of IT. One plausible reason is that many companies were investing substantially in IT to facilitate information access and communication.

Fig. 1c also shows that firms are generally reducing emphasis on informational IT investment in future. One possible reason is the upward shift towards strategic IT investment in the future. Other reasons are evident from the following quotes:

Informational infrastructure investment has peaked. IT is becoming more and more integrated with the business. I see more efforts channeled to creating new horizons for business to be conducted and how IT can be used strategically.

Systems Development Manager

Investment in information infrastructure has already been established. Any incremental investment is merely to upgrade and replace existing infrastructure. Thus, it is understandable that informational IT investment is on the decline.

Accounts Executive

However, one interesting finding from discussion sessions with respondents is the notion that the nature of informational IT investment will change rather than the absolute amount of the investment. Comments given by respondents in support of this notion are as follows:

The computer systems and databases are not likely to face a drastic overhaul, except for minor upgrading. The new form of informational IT investment is now geared towards Internet tracking, electronic commerce, etc.

Corporate Accounts Manager
Spending in informational IT would be made differently henceforth. In the past, efforts are constantly made to improve the credibility of the database. Future emphasis for the next few years would be to improve the accessibility of the database.

Systems Development Manager

It is evident that some firms are investing in Internet technology and electronic commerce whereas others may be emphasizing on the creation of data marts and data warehouses to facilitate easy access to information. These investments are made not only for informational purposes, but also for strategic advantage in terms of helping firms to better utilize information and compete more effectively.

4.3.4. Threshold IT investment

Threshold IT is investment that must be made just to compete. Firms investing in threshold IT do not view getting a positive return from the investment as a top priority. IT is a necessity regardless of the accounting rationale. Fig. 1d shows the threshold IT investment trend for firms practising each of the three different roles of IT.

The results show that the level of expenditure for threshold IT generally declines over time for the three types of companies. Conceptually, threshold IT is closely related to investment in systems that have become strategic necessities. Some researchers have claimed that all strategic systems will eventually become strategic necessities (Seaton, 1990). The fact that the proportion of threshold IT investment is declining indicates that many firms may be reluctant to view such investment in IT as strategic necessities. Rather, they may tend to view such investments as conferring some informational or strategic value.

One plausible reason is that the role of threshold IT may be difficult to justify since many firms do expect IT to deliver some tangible positive returns. Consequently, many companies may be reluctant to attribute any IT investment to the objective of imitating competitive actions.

4.3.5. IT investment: another perspective

Fig. 1e offers another perspective on the trends of IT investment. It combines the average percentage of IT investment for each of the management objective for the three types of organizations, across the three time horizons. For example, the first three bars indicates the average percentage of transactional IT investment made by the three organizations. The next three bars applies to strategic IT investment and so forth.

Firms with a traditional outlook for the role of IT appear to spend the bulk of their IT budget on transactional management objectives, except for the present moment whereby informational IT investment is the highest of the four management objectives. This could be because these firms do not seek to actively use or involve IT in their business strategy. Such firms still view IT as a tool to reduce transaction/operation costs, mainly for the benefit of backroom operations.

On the other hand, firms which adopt an evolving role of IT appear to be giving greater emphasis to strategic IT in the near future. These firms realize the supporting role of IT in business strategy. In three years time, strategic IT will form the bulk of the organizations’ IT budget. One likely reason is that, in the service sector, there is an increasing need to invest in strategic IT to gain competitive advantage, perhaps through new innovative services. Evidence of the increasing emphasis on strategic IT investment is given by the following quote:
I envisage that once our company is through with the rationalization exercise, we are likely to invest more in strategic IT. This may not necessarily mean to copy competitive actions but rather to invest strategically to gain competitive advantage.

Accounts Executive

The same pattern of strategic IT investment is detected for firms with an integral role of IT. These firms have been aggressively investing in their information infrastructure, presumably to prepare themselves for the next stage of their competition. This is indicated in Fig. 1e, as in three years’ time, the companies are projected to invest 37% of their IT budget on strategic IT. A Corporate Accounts Manager offered the following explanation.

Firms need to establish its information infrastructure before they can be competitive service providers. Firms with a integral outlook for the role of IT will reap first-mover advantages. This will enable firms with well entrenched infrastructure to move into the next stage of competition.

Corporate Accounts Manager

This view is in line with the findings of a recent survey of top IS issues by Brancheau, Janz and Wetherbe (1996) which found that building a responsive IT infrastructure is a major theme for many IS executives as they enter the late 1990s. Once the information infrastructure is in place, it becomes easier for firms to exploit IT for strategic purposes.

5. Limitations

This study has three main limitations. First, the sample size is rather small which may make generalization difficult. However, despite the small sample size, the results demonstrate that the type of IT investment being emphasized generally varies over time. Second, the use of single respondent per firm may result in common source bias. Future research may use more than one respondent per firm. Third, the cross-sectional nature of this study make inferences of causality difficult. This limitation is not viewed as serious since the aim of this study is not to demonstrate causality but to demonstrate that the role of IT is related to how an IT budget is allocated to fulfil four management objectives (transactional, strategic, informational and threshold).

6. Conclusions

Results of this study revealed interesting insights into the trends of the four types of IT investment (transactional, strategic, informational and threshold), categorized according to the different roles of IT in their organizations (i.e., traditional, evolving and integral), across the three time frames (3 years ago, presently, 3 years later). Firms adopting a traditional role appear to favor the use of transactional IT. This is expected as such firms view cost cutting as a top priority. They view IT as a tool to support operations, decision-making and administrative functions.

On the other hand, the study detected an increasing trend of strategic IT investment for firms with evolving or integral role of IT. Firms adopting an integral role are likely to invest the highest
percentage of IT budget, relative to the other types of firms, to strategic IT. Firms are gradually realizing the importance of strategic IT in their organization. In the next three years, strategic IT is likely to form the bulk of the organizations’ IT budget for firms adopting either an evolving or integral role of IT (see Fig. 1b). One plausible reason is that, in the service sector, there is often a constant need for innovative services in order to stay competitive or even to survive. Hence, investment in strategic IT is necessary in order to introduce new products/services and compete more effectively.

Generally, in the near future, informational IT investment appears to be declining for firms with traditional or evolving role of IT. One plausible reason is that investments in strategic IT may increasingly take precedence over investment in informational IT as firms struggle to leverage IT more effectively. Moreover, the nature of informational IT investment is likely to shift towards adopting newer information technologies like Internet and data warehousing which may offer some strategic value to the firm.

There appears to be a declining level of expenditure for threshold IT especially for firms with integral role of IT. A reason for this decline is that firms may find it difficult to justify such investments and are therefore reluctant to explicitly allocate much of their IT investment to this management objective.

This study makes a contribution to existing literature by extending Weill’s (1990,1992) work. Specifically, we examine the relative proportion of IT investment for each of the four management objectives (transactional, strategic, informational and threshold) over time. The findings provide important insights into the changing emphasis of the four types of IT investment over time and affirm the increasing importance of strategic IT investment. While existing literature may emphasize that threshold IT in terms of strategic necessities may become more important as firms imitate their competitors, the results of this study show a decreasing trend for threshold IT investment. This implies that although firms may invest in IT because it is a strategic necessity, they do not consider such investment to be solely for that purpose. Instead, they tend to view such investment as conferring some strategic benefits, probably because firms tend to improve on competitors’ innovation rather than pure imitation.

In line with our results, we would like to offer three predictions for the new millennium. First, IT will increasingly become an integral part of business strategy as firms seek to improve productivity and compete more effectively. This is particularly true in Asia which has been adversely hit by the economic crisis in 1997–1998. As the result, managers are likely to view IT as a possible way of riding out the downturn through more effective deployment of IT to support current strategies or to enable new strategies (Soh & Neo, 1999). Second, the advent of the Internet has increased the importance of IT and opened new opportunities that can dramatically alter the way a firm compete (Ng, Pan & Wilson, 1998). For example, intranets (which links different units within the firm) and extranets (which links the firm to its business partners) have enabled firms to reduce costs and streamline business operations. Third, existing IT applications are likely to be increasingly linked to Web-based applications as firms seek to leverage the Internet for competitive advantage. These applications may blur the distinction among the various types of IT investments since the Internet can be used to lower costs, provide easier access to information, facilitate competitive advantage and is likely to become a strategic necessity for most, if not all, firms.

In summary, different trends of the four types of IT investment may exist for firms adopting the different roles of IT. Practitioners should be aware of the role IT plays in their organizations and
trends of IT investment in order to better formulate business strategies and harness the desired level of IT integration with business strategy.

Appendix A. Questionnaire

A.1. IT investment objectives

What is your opinion on the contribution of IT in achieving the following objectives? Please allocate a total of 100 points to indicate the relative degree of contribution, *making sure that each column adds up to 100.*

<table>
<thead>
<tr>
<th>Contribution of information technology</th>
<th>3 years ago</th>
<th>present</th>
<th>3 years later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut operating costs.</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Gain competitive advantage and increase sales/market share.</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Invest in information infrastructure (e.g. telephone, facsimile and e-mail systems) to facilitate information access and communication.</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Invest just to compete, simply because other competitors are doing it.</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

A.2. Role of information technology (IT)

Which of the following best describes the role of information technology (IT) in your organisation? (Please tick *one* only)

- Traditional Role: IT supports operations, decision-making and administrative functions, but is not strategy related.
- Evolving Role: IT supports business strategy, but is not an integral part of the strategy formulation process.
- Integral Role: IT is integral to business strategy, whereby information systems (IS) and business management work together to formulate organisational strategies.
References


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