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IT PORTFOLIO MANAGEMENT: A FRAMEWORK FOR MAKING STRATEGIC IT INVESTMENT DECISIONS

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Abstract

IT spending has been recognised as representing a large percentage of the budget for organisations. Research has shown that significant value can be derived from IT investments if organisations actively and effectively manage their IT investments using a portfolio management approach. The goal of this paper is to contribute to the understanding of how IT portfolio management affects strategic IT investment decision making. First, an IT Portfolio Management Maturity Index is developed so that IS managers can readily assess the level of maturity of their organisation’s IT portfolio management. Second, a structural model is presented to examine the influence of IT portfolio management on decision rationality and organisational political behaviour. Next, we examine how these two outcomes of IT portfolio management impact firm performance. The proposed framework can be used as a benchmark for managers to understand how to allocate IT resources most effectively. It also serves as a foundation for further research in IT portfolio Management and other IT governance mechanisms.

Keywords: IT Portfolio Management, IT investments, strategic decision-making.
1 INTRODUCTION

IT expenditure represents a large percentage of the budget spending for organisations and is set to rise further. The median growth in IT spending across all sectors in a recent survey is 4.1%, outpacing overall U.S. GDP growth of 3.5% in 2005. IT spending as a percentage of gross revenues ranges from 1.5% to 7.0% while the average is now greater than 4.2% of annual revenues (Weill & Ross 2004). This represents more than 70% of capital spending for most companies (Maizlish & Handler 2005).

Companies that actively and effectively manage their IT investments through the use of IT portfolio management have been found to derive measurable value from IT investments (Maizlish & Handler 2005). This is consistent with the stream of IT business value literature that suggests the strategic value of IT is rooted in its ability to enable complementary organisational investments (e.g. Brynjolfsson & Hitt 2000). Organisations that are able to position their IT investments as strategic assets would be able to harness the value of those assets and potentially create a sustainable competitive advantage. This drive to maximize return on technology spending has been one of the reasons fuelling the increasing prominence of portfolio management (Broadbent, Weill & Clair 1999; Cooper 1998; Cooper et al. 1999; Weill & Aral 2006; Weill & Olson 1989; Weill & Ross 2004).

Portfolio management has its roots in the field of financial management. Financial managers or controllers had long been enjoying the ability to maximize the returns of an array of investments with the assistance of quantitative techniques. By using approaches proposed by the Modern Portfolio Theory (Markowitz 1952), they are able to obtain the optimal investment portfolio which will yield the highest returns for the specified risk tolerance of their organisations. However, it was suggested that Markowitz’s Modern Portfolio Theory (MPT) and other financial portfolio theories do not work for IT investments which are usually illiquid in nature (Kersten & Verhoef 2003).

In the domain of IS management, project portfolio management emerged as a means for organisations to make strategic choices when governing and investing in multiple large, complex new product development projects. McFarlan (1981) was regarded as the first to propose a portfolio approach to managing IT projects. Portfolio management methods have been developed for use in technology portfolio management, information technology portfolio management, project portfolio management, new product portfolio management and service portfolio management, all of which remain fundamentally similar (Cooper et al. 1999; Kaplan 2005).

As IT investments evolved into organizational strategic assets and organisations acquire and manage more IT resources, there is a need to expand the scope of portfolio management beyond software projects. This led to the evolution of IT Portfolio Management as a related but distinct and much broader field (Verhoef 2002). An organisation’s IT portfolio could encompasses all direct and indirect IT projects and assets, including components such as infrastructure, outsourcing contracts and software licenses (Bonham 2005; Leliveld & Jeffery 2003).

Accordingly, we define IT Portfolio Management (ITPM) as follows:

**IT Portfolio Management is the combination of tools and methods used to measure, control, and increase the return on both individual IT investments and on an aggregate enterprise level in a desirable manner that meets the organisation’s business objectives without exceeding available resources or violating other constraints.**
Despite the growing attention to ITPM in the practitioner community (Weill & Aral 2006), there is a dearth of research in the IS academic community. Numerous disparate frameworks have been proposed to assess organisations’ ITPM maturity. However, there is a lack of a theoretically-derived ITPM maturity index that can be used to explain and predict the outcomes of ITPM. Next, the relationship between ITPM maturity and firm performance is poorly understood. To address these issues, this paper has two main objectives. First, we synthesis the extant works on ITPM maturity models to devise a more concise measure for IS managers to readily assess their level of ITPM maturity. Next, we develop a structural model linking ITPM maturity to desirable outcomes of strategic decision making, and how these outcomes of decision-making rationality and politicking affect firm performance.

2 CONCEPTUAL DEVELOPMENTS AND HYPOTHESES

2.1 Proposed Research Model

The proposed research in Figure 1 assesses the effects of IT Portfolio Management Maturity on the IT investment decision, and the effects these have on firm performance.

![Figure 1. Proposed Model of IT Portfolio Management as Strategic Decision-making.](image)

In this model, we regard IT Portfolio Management as a strategic decision-making process, whereby limited resources are allocated to various IT investments, ensuring that a balanced portfolio of investments is made to satisfy the multiple objectives of the firm. We reviewed the decision-making literature and uncovered several dimensions of the strategic decision-making process including rationality and comprehensiveness (Dean & Sharfman 1993a; Dean & Sharfman 1993b; Dean & Sharfman 1996; Lyles & Mitroff 1980; Miller 1987), political behaviour (Dean & Sharfman 1993b; Dean & Sharfman 1996; Hickson et al. 1986; Lyles & Mitroff 1980) and centralization (Cray et al. 1988). However, only two dimensions salient to our research context were considered, namely the rationality and the political behaviour of the strategic decision. These two dimensions have been central to the decision-making literature, and have been recommended specifically for future research (Eisenhardt & Zbaracki 1992). Furthermore, these two constructs are logically and empirically distinct (Dean & Sharfman 1993a; Dean & Sharfman 1996), that is, decision processes could be political but not rational, rational but not political, both political and rational, or neither political nor rational.
### 2.1.1 Development of IT Portfolio Management Maturity Index

The IT Portfolio Management Maturity Model introduced by Jeffery and Leliveld (2004) and Reyck et al. (2005) for assessing what constitutes best-practice IT Portfolio Management is segmented into four stages: *ad hoc*, *defined*, *managed* and *synchronised*. This corresponds to stages 0 to 3 in the maturity model in Table 1. The ITPM elements we have identified were synthesised from prior literature to serve as a comprehensive yet more concise measure.

<table>
<thead>
<tr>
<th>ITPM Element</th>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Centralisation</strong></td>
<td>No centralised database of projects.</td>
<td>All projects kept in one database; IT spending tracked centrally and rolled into one database</td>
<td>In addition to the centralised database, a centralised project office is responsible for collecting, analysing and distributing project information in a common format; Projects are monitored occasionally.</td>
<td>In addition to the centralised database, the centralised project office almost always monitors and controls projects.</td>
</tr>
<tr>
<td><strong>2. Financial metrics</strong></td>
<td>Financial metrics are not used for appraisal.</td>
<td>Some financial analysis is undertaken with special attention to Payback Period and ROI.</td>
<td>NPV and/or IRR are sometimes utilised for evaluation and prioritisation of projects.</td>
<td>Financial analysis is always done. NPV and/or IRR are almost always used.</td>
</tr>
<tr>
<td><strong>3. IT investment decision-making techniques (e.g. Balanced Score Card, Critical Success Factors)</strong></td>
<td>Such techniques are not used for appraisal.</td>
<td>Such techniques are used once in a while.</td>
<td>Such techniques are occasionally used to evaluate projects.</td>
<td>A combination of such techniques is used to get a holistic picture of projects and to evaluate projects almost always.</td>
</tr>
<tr>
<td><strong>4. Risk analysis</strong></td>
<td>Risk and uncertainty are not considered during evaluation.</td>
<td>Occasionally risks are evaluated. In most cases the attention is in financing/cash flow risks.</td>
<td>Financing/cash flow risks are considered but most of the focus is in the complexity of the project and technology risk.</td>
<td>An extensive risk analysis is almost always performed. Attention is devoted to project complexity, technological risks team experience and cash flow risks.</td>
</tr>
<tr>
<td><strong>5. Interdependencies</strong></td>
<td>Overlaps and duplication of project results are not considered.</td>
<td>Some consideration of overlaps and duplication of project results.</td>
<td>Cross-project dependencies and implementation bottlenecks are frequently considered.</td>
<td>Interdependencies are almost always managed. In addition, significant attention is given to cross-project dependencies.</td>
</tr>
<tr>
<td><strong>6. Constraints</strong></td>
<td>Constraints are not considered.</td>
<td>Little constraint analysis. Only the control of the budget/financial capacity is considered.</td>
<td>Frequently evaluate budget/financial capacity and competition for scarce resources. Other constraints, such as staff capabilities to implement projects are occasionally evaluated.</td>
<td>Budget/financial capacity constraints are almost always evaluated. Other aspects such as staff capabilities and competition for scarce resources are frequently managed.</td>
</tr>
</tbody>
</table>
Table 1. IT Portfolio Management Maturity Model.

<table>
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</thead>
<tbody>
<tr>
<td>7. Top management involvement</td>
<td>Top management never involved in project selection.</td>
<td>Occasionally have top management involved in project selection.</td>
<td>Frequent involvement of top management in the project selection process.</td>
<td>Systematic review of projects at specific stages. Top management almost always involved in the project selection process and business leaders are accountable for project results.</td>
</tr>
<tr>
<td>8. Optimisation</td>
<td>No processes in place to optimise the portfolio.</td>
<td>Very few processes to optimise the portfolio are in place. Some efforts are spent in generating regular project portfolio reporting.</td>
<td>Frequently have regular project portfolio reporting and annually, or more frequently, the overall project portfolio is prioritised.</td>
<td>Processes to optimise the portfolio are almost always applied. Project outcomes are always compared with the original targets and project benefits are frequently centrally tracked.</td>
</tr>
<tr>
<td>9. Specialised software</td>
<td>Manual; Software not used.</td>
<td>Non-specialised software used to manage the project portfolio.</td>
<td>Occasionally use specialised software to manage the project portfolio.</td>
<td>Use of portfolio software almost always – real time updates on portfolio modifications, performance and health.</td>
</tr>
</tbody>
</table>

To derive the index, we propose the scoring of each ITPM element on a scale of 0 to 3 depending on the stage of maturity. The overall score of the ITPM maturity index will range from 0 to 3 and is computed using the principal components factor analysis approach (Diamantopoulos & Winklhofer 2001), given by the following formula:

$$ \text{ITPM maturity, } \eta = \gamma_1 x_1 + \gamma_2 x_2 + \ldots + \gamma_9 x_9 $$

$\gamma_i$ is the weight reflecting the contribution of $x_i$ to the latent variable $\eta$ (ITPM maturity). The weights are obtained from the estimated structural model (see Figure 2). $x_n$ represents the scores of each of the nine elements.

2.1.2 Decision-making Rationality

Procedural rationality is defined as the extent to which the decision process involves the collection of information relevant to the decision and the reliance upon analysis of this information in making the choice (Dean & Sharfman 1993b; Dean & Sharfman 1996). The term “procedural” has been used to focus on the decision-making process itself and to distinguish this construct from more global conceptions of rationality. Besides encompassing the characteristics of conducting extensive analyses, decision-making rationality in our model will also include the use of formal planning processes (Goll & Rasheed 2005), as well as participative and comprehensive decision making (Fredrickson 1983, 1984).
2.1.3 Political Behaviour

Organisations can be viewed as political systems, made up of coalitions of people who may have conflicting goals or competing interests (Allison & Zelikow 1999; Eisenhardt & Bourgeois 1989). These conflicts arise from different views on the shape of the future, biases induced by position within the organisation hierarchy, clashes in professional and personal factors or ambitions (Allison & Zelikow 1999; Hickson et al. 1986; Pettigrew 1973). The definition of political behaviour we adopted in the model followed that of Allen et al. (1979) and Dean and Sharfman (1996), which is the intentional acts of influence to enhance or protect the self-interest of individuals or groups.

2.1.4 Firm Performance

Firm performance can comprise of various measures variables including productivity, efficiency, profitability and competitive advantage (Melville, Kraemer and Gurbaxani 2004). Following Wade and Hulland’s (2004) recommendation that the dependent variable used in a resource-based study should incorporate a competitive assessment of performance, enhanced firm performance resulting from effective ITPM would be assessed relative to major competitors.

2.2 Hypotheses

2.2.1 Impacts of ITPM Maturity on Strategic-Decision Making

IT Portfolio Management can be instrumental in improving communication between business units and IT (Jeffery & Leliveld 2004), which further leads to better alignment between IT and business leaders (Datz 2003). It helps senior management to communicate on the same wavelength because it provides a common nomenclature, definitions, and classifications (Kaplan 2005) together with facts and insights needed to convince executives about IT investment decisions (Jeffery & Leliveld 2004). The ability to communicate project priorities both vertically and horizontally within the organisation (Cooper et al. 2000) leads to more transparency within the organisation and reduces politics in decision making, thereby improving the quality of decisions (Kaplan 2005).

Hypothesis 1 (H1): A higher level of IT Portfolio Management maturity will significantly enhance decision-making rationality of IT investment decisions.

Resources are often wasted when management insists on investing in pet projects and setting priorities on projects that were politically driven. It was found that the majority of the organisations that employed portfolio management reported better decisions (Tjan 2001). Hence, IT Portfolio Management would likely serve as a tool for effective and objective decision making because it reduces if not replaces political contests with fact-based and collaborative decision-making between the business and IT managers (Hoque et al. 2006; Kaplan 2005). With more effective decision making, redundant projects can be reduced and projects with vested interests become easier to eliminate (Datz 2003).

Hypothesis 2 (H2): A higher level of IT Portfolio Management maturity will significantly reduce political behaviour of IT investment decisions.

2.2.2 Impacts of Strategic-Decision Making Outcomes on Firm Performance

Rational decisions are made based on relatively complete information and knowledge constraints. In making such comprehensive decisions, managers collect extensive information (Dean & Sharfman 1996), consider different alternatives, courses of action, and multiple decision criteria (Simons et al. 1999). After managers have analysed the organisation’s internal aspects and external environment, they are expected to systematically make strategic decisions based on objective criteria (Goll & Rasheed 2005). Consequently, they would be able to perceive environmental conditions more accurately, and hence make more comprehensive business decisions leading to better firm performance (Bourgeois 1985; Goll & Rasheed 2005). Expectedly, successful firms have been found
to use rational methods more than unsuccessful firms (Bourgeois & Eisenhardt 1988). This is further supported by the meta-analyses of Miller & Cardinal (1994) and Schwenk & Shrader (1993), showing that the overall relationship between formal planning and performance across studies is positive and significant.

**Hypothesis 3 (H3): A higher level of decision-making rationality of IT investment decisions will significantly improve firm performance.**

In order to achieve organisational goals and better firm performance, decisions need to be made based on unbiased organisational objectives, relatively complete and accurate information, and an understanding of environmental constraints (Dean & Sharfman 1996). However, in a political system, people will take actions to enhance their power in order to influence a decision (Eisenhardt & Zbaracki 1992). These actions involving politics, observable but often covert, include formation of coalitions, lobbying, cooptation, withholding agendas, control of agendas, as well as manipulation and control of critical information channels (Pettigrew 1973; Pfeffer 1981, 1992). Since decisions made based on politics centre around the self-interests of individuals or groups (Pettigrew 1973; Pfeffer 1981), it is likely that such decisions will not be aligned with the interests of the organisation (Dean & Sharfman 1996). In addition, restriction of information flow (Pettigrew 1973) will also hamper efforts to make decisions based on comprehensive information. With inadequate or inaccurate information, it is not surprising that the outcome of such decision-making processes will be less than optimal. This, in turn negatively impacts the performance of the organisation.

**Hypothesis 4 (H4): A higher level of political behaviour of IT investment decisions will significantly reduce firm performance.**

### 3 RESEARCH METHOD

#### 3.1 Data Collection

We plan to conduct a survey to gather the data required to test our research hypotheses. The questionnaires will be administered to CIOs and senior IT executives in various industry sectors to ensure generalizability of our findings.

#### 3.2 Measurement

**IT Portfolio Management Maturity** is measured using the nine-indicator IT Portfolio Management Maturity Model presented in Table 1. The maturity model is constructed as an index, adhering to the recommendations by Diamantopoulos and Winklhofer (2001) in terms of **content specification, indicator specification, indicator collinearity** and **external validity**. For content and indicator specification, key elements of project portfolio management were identified from extensive review of the literature for inclusion as indicators. As for indicator collinearity, any particular indicator which turns out to be almost a perfect linear combination of the other indicators is likely to contain redundant information (Bollen & Lennox 1991) and hence these will be excluded from the index. The model in Figure 2 is used to gather evidence in support of the external validity of the IT Portfolio Management Maturity index which is represented as $\eta_1$ (the latent variable). $x_n$ is a formative indicator, represented by the $n^{th}$ element in the maturity model, where $n$ can take values from 1 to 9 (for the 9 elements). $\eta_2$ is represented by decision-making rationality, which is measured by five reflective indicators ($y_1$ to $y_5$). Since a higher level of IT Portfolio Management maturity should improve decision-making rationality (Hoque et al. 2006; Kaplan 2005), it is expected that $\beta_{21} > 0$. If estimation of the model results in a good overall fit, evidence in support of the external validity of the IT Portfolio Management Maturity model is obtained.
**Figure 2.** Two-construct model with Formative and Reflective Indicators to Check the Validity of the IT Portfolio Management Maturity Model.

*Decision-making rationality* is measured with a scale adapted from Goll and Rasheed (2005). It is based on a scale with seven items, called the Progressive Decision-Making scale (Goll and Sambharya 1995). However, only five of the seven original items that best reflect the construct of decision-making rationality in our research context are included in the adapted scale:

- Systematic search for opportunities and problems, and a systematic consideration of costs and benefits when planning.
- The strategic and long-term importance of participative decision making at management levels.
- The explanation of proposed changes to those affected by them.
- Participative consensus-seeking decision-making with feedback.
- Open channels of communication.

*Political behaviour* is measured with a scale adapted from Dean and Sharfman (1996), which includes four items:

- Group members primarily concerned with their own goals instead of organisational goals.
- Group members being open with each other about their interests and preferences in the decision.
- Decision affected by the use of power and influence among group members.
- Decision affected by negotiation among group members.

*Firm performance* is operationalised as a competitive assessment of performance, comprising of the following six indicators measured relative to major competitors for the previous 3-year period:

- Revenue growth
- Profit growth
- Market share growth
- Profitability
- Return on investments
- Return on assets

Short-term variations on the reported performance of the firm are minimized by seeking three-year averages. Since not all firms in our sampling frame are publicly listed, detailed financial data will be difficult to solicit. Therefore, subjective, self-reported measures of organisational performance will be obtained. Subjective, self-reported performance measures have been found to be highly correlated with objective measures of firm performance (Dess & Robinson 1984). The reliability and validity for such subjective measures have been further supported by Venkatraman and Ramanujam (1986, 1987). The multidimensionality of the performance construct (Cameron 1978; Chakravarthy 1986; Melville et al. 2004) is reflected by the use of multiple measures for firm performance. A competitive assessment of performance against major competitors is used to control for variations in performance that may be due to industry (Dess, Ireland & Hitt 1990) effects.
4 CONCLUSION

By framing IT investment decision-making as a strategic organisational decision, we have presented a framework to understand the impacts of IT Portfolio Management. The IT Portfolio Management Maturity Model, which was constructed as an index, aims to assist managers in identifying areas for improvement when they review their organisation’s ITPM practices. It can also serve as a benchmarking tool for organizations to assess their ITPM maturity relative to their competitors in an effort to recalibrate their IT governance mechanisms.

Research in IT Portfolio Management is currently very limited and hence presents immense opportunities for IS researchers to advance our knowledge in this area. Our proposed research model can contribute empirical evidence to improve our understanding of this important IS management topic. Results will certainly contribute significantly towards the stream of IT business value literature. In addition, ample work can be pursued to extend our framework by identifying other outcomes of ITPM that can influence the complex IT investment decision-making process, and taking on a wider strategic view by examining the effects of ITPM on relative competitive advantage, differentiation towards competitors, innovative character, and process flexibility.

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