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A Theoretical Framework for Information Systems Portfolio Management

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Abstract

Information systems portfolio management is a tool that is increasingly being used by large organizations to keep track of IT projects and align those projects with organizational strategy. This paper is an initial attempt to provide a theoretical lens with which to view the IS portfolio management phenomenon. Contingency theory, modern portfolio theory, and absorptive capacity serve as theoretical perspectives from which to examine IS portfolio management.

Keywords

Information systems portfolio management, contingency theory, modern portfolio theory, absorptive capacity

Introduction

The purpose of this paper is to provide information systems (IS) researchers with a theoretical framework to apply to the phenomenon of IS portfolio management. The paper is organized as follows. An overview of IS portfolio management is put forth, followed by an introduction of possible theories that might guide IS researchers in their study of this phenomenon. Finally, a conclusion will be presented that includes possible directions for future research.

Organizational attempts to align business and IS objectives have led to the increasing use of program management offices to track projects and align them with organizational goals. As an extension to the program office, firms have begun to employ IS portfolio approaches to manage their entire universe of software application projects. McFarlan (1981) first espoused the idea of managing a firm’s IS projects and applications as one large portfolio designed to align software application projects with business strategies more than 20 years ago. Nevertheless, practitioners have only recently embraced
the notion of portfolio management (Waxer, 2005). Practitioners such as Maizlish and Handler (2005) have indicated that high levels of IS spending and the need to align IS with organizational strategy make IS portfolio management necessary for all firms. With the increasing complexity of projects and business needs, CIO’s must monitor the entire IS enterprise on a number of fronts. First, issues related to managing IS resources, such as IS project staffing levels and IS staff skills-sets, are increasingly becoming critical issues for managing the firm’s infrastructure. The use of IS portfolio management should facilitate improved resource management to ensure that the appropriate human resources are working on the right projects and to facilitate tracking of project financial data and alignment with business goals. Second, budgetary concerns are also critical, due to pressures of managing limited financial resources for hardware, software, and human resources.

Thus IS portfolio management is a combination of organizational process, structure, and technology. The components are depicted in Figure 1. Each one of these organizational components helps to shape the IS portfolio and to enable information systems to support the organization. Organizational processes define how the IS portfolio will be managed in the effort to carry out digitally enabled tasks. Organizational structure aligns the IS portfolio with business units, product lines, and departments to meet the needs of management. At the same time, the technology used in the IS portfolio has the ability to both enable and constrain the organization in terms of which processes can be digitized and/or streamlined.

![Figure 1. IS portfolio management](image)

**Research Framework**

Portfolio management is an under-studied phenomenon with considerable opportunities for examination. Organizations are turning to the use of portfolio and program management practices to supervise the implementation and ongoing use of IS across their entire enterprises. Reasons for this trend include the increasing complexity of IS in terms of number of systems and integration between systems, allocation of human resources across projects, dollars invested in information systems, and rapid change of business processes (Benko & McFarlan, 2003; Maizlish & Handler, 2005). As a result, practitioners are attempting to increase the effectiveness of their information systems and mitigate IS risks. This situation causes a number of questions to arise, such as the following. What management practices do organizations implement in order to supervise the portfolio management process? Are management practices used to manage portfolios and programs truly key precursors to the ongoing operations of an effective IS function? How do IS management practices affect IS risks and IS effectiveness?

Research on IS portfolio management is important and different from studies of project management because of the organizational implications of IS portfolio management. At the organizational level, managing budgets, resources, and time become much more critical than at the project level of examination. One reason is that goal alignment between projects and
organization strategy becomes a key component in differentiating organizations (Benko & McFarlan, 2003). Furthermore, IS risks become more driven by market and organizational demands (Bonham, 2005). Therefore organizations that utilize a portfolio management approach might consider incorporating what Benko and McFarlan (2003) refer to as the characteristics of the information frontier.

These characteristics within the IS portfolio reflect organizational transparency, reduced transactional friction, role blurring, and velocity. Organizational transparency refers to the availability of information within organizations that is reported to the public, e.g., shareholders, etc. Reduced transactional friction refers to the possibility of lower costs of contracting, communicating, and coordinating with the use of information systems. Role blurring is a result of reduced transactional friction within and between organizations. Placing emphasis on processes and transactions crosses boundaries between traditional silos such as marketing, accounting, and IT. Blended skill sets from multiple organizational functions become critical to supporting processes. Finally, velocity refers to the speed at which information travels and the fact that many organizations engage in real time processing. Each of these characteristics represents a key attribute of a properly functioning IS portfolio that has the ability to support an organization in its attempt to achieve its organizational goals. Nevertheless, the process of achieving a properly functioning portfolio is subject to a variety of project-level risks that are magnified at the portfolio level, as well as the aforementioned market and organizational risks. There is a need for better understanding of the phenomenon of IS portfolio management and its relationship to larger theoretical perspectives on project management. Introducing a multi-theoretical lens through which to view the phenomenon of IS portfolio management will extend the project management literature to a new area, because IS portfolio management is an organizational phenomenon that has not been extensively researched in the past. Therefore the gap in the literature gives rise to the following research questions: How does IS portfolio management impact IS effectiveness? How does the level of absorptive capacity between IS personnel and business personnel impact IS portfolio management processes? What management practices need to be in place to properly control IS portfolio management processes? The following section will elaborate on theoretical support for the IS portfolio management phenomenon.

Theoretical Underpinnings

Given that program management and portfolio management are firm level, organization wide activities, there are multiple theories that could explain the portfolio management phenomenon. Contingency theory, modern portfolio theory, and absorptive capacity can all be used as theoretical perspectives. Contingency theory is relevant for its assumptions regarding organizations in the context of their operating environments. Modern portfolio theory explains how and why certain projects are included in the portfolio. The concept of absorptive capacity is used to explain the integration and use of portfolio management practices by various managers in order to effectively use IS. The following discussion will give an overview of each theoretical perspective and show how it applies to IS portfolio management.

Contingency Theory Perspective

The basic premise of the contingent perspective revolves around the following assumptions: (a) there is no universal best way to manage an organization; (b) the design of an organization and its subsystems must fit with the environment; (c) effective organizations must have a proper fit with the environment and also between its subsystems; and (d) the needs of an organization are better satisfied when the organization is properly designed and the management style is appropriate for the tasks undertaken (Wade & Tomasevic, 2006). This perspective is appropriate for IS portfolio management for a variety of reasons. The implementation and use of IS across organizations varies according to context. Variability in context can mean that platforms and software configurations may differ. However outcomes within and between industries can still yield positive results. Furthermore, management styles and practices can differ by industry or by organization, yet still have the potential to contribute to IS and organizational success.

IS projects vary based upon a number of factors within a given organization, as well as across organizations. Factors affecting IS project outcomes in business environments include the economy, budgetary and time constraints, technology configurations, and human resources. As a result, a variety of configurations that incorporate key factors can contribute to IS project and portfolio success. Contingency theory is an excellent framework for IS portfolio management, in that there is no
single way to organize, and a variety of inputs can lead to a positive outcome. Specific to IS portfolios, McFarlan (1981) supports a contingency approach to IS portfolio management. The notion of multiple ways to control projects is dependent upon project characteristics. An example of such is user involvement through stakeholders and ad hoc teams that vary by project (McFarlan, 1981).

Contingency theory has been used in IS research as a framework to help explain variance in complex IS phenomena. Thus, multiple and often conflicting contingencies are understood as normal occurrences in today’s complex business environments. Organizations are routinely faced with a number of potentially conflicting contingencies. Given that there is not one right way to organize, the processes of implementing and maintaining portfolios of information systems are subject to the nuances of each individual organization. Thus, differing organizational configurations and management practices can result in effective IS and positive organizational performance. Therefore, IS research in organizations requires the use of the systems approach in contingency theory, since it views organizations as entities that maintain many potentially conflicting contingencies that interact with one another to affect performance. Specific to the IS portfolio, contingency theory will be used as an overarching meta-theory to elucidate how multiple IS-related contingencies affect perceptions of IS effectiveness and IS risk.

Financial Portfolio Perspective

Portfolio management for information systems is much akin to that of modern portfolio theory (Markowitz, 1959). Modern portfolio theory dictates that a mix of financial assets (stocks) be held to maximize return while minimizing risk. Therefore, the overall investment strategy seeks to create an optimal portfolio by considering the relationship between risk and return. The risk of a particular stock should not be examined on a standalone basis, but rather in relation to how that particular stock's price varies in relation to the overall market portfolio. Therefore, each investment has the potential to significantly impact the design of the organization (Milgrom & Roberts, 1991). Benko and McFarlan (2003) adapt the financial portfolio approach by examining each IS project in terms of its risk profile and its contribution to organizational goals. Table 1 compares the financial and project portfolios.

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<th>Financial Portfolio</th>
<th>Project Portfolios</th>
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<tr>
<td><strong>Assets</strong></td>
<td>Financial instrument w/distinct characteristics</td>
<td>Projects w/distinct characteristics</td>
</tr>
<tr>
<td><strong>Diversification</strong></td>
<td>Multiple financial instruments can reduce risk</td>
<td>Many project variables-scope, approach, vendor, project mgr can reduce risk</td>
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<tr>
<td><strong>Goals</strong></td>
<td>Income &amp; capital gains</td>
<td>Profitability &amp; growth</td>
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<td>Cost reduction</td>
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<td><strong>Asset Allocation</strong></td>
<td>Invest according to investment goals</td>
<td>Invest according to org intentions</td>
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<td><strong>Connection</strong></td>
<td>Correlation</td>
<td>Interdependency</td>
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The ultimate goal of using a portfolio approach to manage software applications is to give the firm the ability to more effectively derive value by allowing information technology to support business objectives. Just as there are a number of variations in approach to financial portfolios, practitioners hold varying views about what an IS project portfolio is, as well
as how the portfolio should be managed. A review of the IS literature reveals a paucity of information related to IS portfolio management, with a few notable exceptions. McFarland (1981) was the first to introduce the idea of IS portfolio management. This concept was extended by Weill and Vitale (1999), who presented a framework for assessing the health of an IS applications portfolio. Cameron (2005) provided an overview of the IS portfolio phenomenon for researchers; however, Cameron’s research was primarily based upon practitioner insights. Additional practitioners, such as Datz (2003), have also provided additional commentary about why portfolio management is an essential tool for enhancing the impacts of IS.

Practitioners such as Bonham (2005) and Maizlish and Handler (2005) have provided “how to” guides for implementing and maintaining an IS project portfolio. Benko and McFarlan (2003) also provided a framework to organize IS projects as a single portfolio. The practitioners who have put forth “how to” guides for portfolio management all rely heavily on the notion that an IS portfolio is akin to a financial portfolio, such as a mutual fund. The authors rely on modern portfolio theory and portfolio selection (Markowitz, 1952, 1959) to support their hypothesis that an IS portfolio can be similar to a financial portfolio. In the same vein that a properly selected mix of financial assets can mitigate risk and increase overall financial returns, the proper selection of IS projects aligned with an organization’s strategic objectives can increase organizational returns and reduce IS risks.

Absorptive Capacity

Successful implementation and use of IS are linked to effective management of a number of processes associated with the planning, acquisition, and implementation of an organization’s portfolio of IS resources (Cash, McFarlan, & Mckenney, 1988). These processes or practices are employed by both business and IS management for the purpose of effective system use. Proper IS use is therefore dependent upon the development of IS-related knowledge and processes that exist among an organizations’ IS managers and line managers (Boyton, Zmud, & Jacobs, 1994). Shared knowledge between IS and line managers is described by Nelson and Cooprider (1996) as an “understanding and appreciation for the technologies and processes that affect their mutual performance”. Knowledge sharing activities include such IS tasks as requirements gathering, project planning, and project implementation. Within each of these activities, discourse occurs between IS and line managers at both the individual and group levels. These activities are critical situations where high levels of knowledge sharing can facilitate performance. When knowledge is not adequately shared between the two groups, it is highly probably that less than optimal systems will be implemented. Thus knowledge sharing between business and IT groups creates the opportunity to decrease inherent IS risks and establish and maintain sound management practices surrounding an organizations’ portfolio of systems, as well as to facilitate higher levels of effectiveness in the IS portfolio.

The concept of absorptive capacity fits well with IS portfolio management, because the theory focuses on sharing knowledge between individuals or groups in order to achieve a competitive advantage. In general, the use of absorptive capacity can facilitate knowledge between individuals and/or groups. From an IS perspective, knowledge sharing between the business and the IS function within organizations must be seamless. This is necessary to ensure properly functioning management practices that allow the organization to successfully complete IS development projects, as well as to ensure proper maintenance and ongoing monitoring of the IS portfolio.

Discussion

In conclusion, the use of multiple theoretical perspectives to explain IS portfolio management is useful because of the organizational complexity of the phenomenon and because portfolio management is necessary in large organizations. Contingency theory recognizes that each organization has the ability to organize a portfolio that is unique relative to other organizations and still be successful. Portfolio theory supports the notion that managerial choices on the inclusion of specific projects influence the composition of the portfolio with regard to risk. Finally, the notion of absorptive capacity recognizes the need for knowledge sharing, inasmuch as many IS tasks need the input of both IS personnel and business personnel in order to achieve optimal solutions for business problems. Thus contingency theory, portfolio theory, and the concept of absorptive capacity all help explain the phenomenon of IS portfolio management. These three theoretical perspectives support the notion that IS portfolio management is a combination of the structures, managerial processes and technologies that are in use in the organization. IS portfolio management is a phenomenon that illustrates the hypothesis put forth by Woodward (1965) that there is a link between technology and social structure.
This application of theory to the portfolio management phenomenon gives researchers a basis to begin examining the under-researched phenomenon of IS portfolio management. Future research on portfolio management should include firm level research on the perceptions of IS portfolio effectiveness and on the antecedents to a properly functioning and strategically aligned portfolio. Those antecedents might include IS risks at the portfolio or project level as well as the level of absorptive capacity (shared knowledge) between business and IS personnel. Furthermore, quantitative measures of portfolio management, such as number of projects completed on time or size of projects, should be studied to determine how they impact firm level financial measures such as return on assets, return on investment, etc. In conclusion, this paper has put forth some possible theoretical underpinnings for understanding IS portfolio management that should enable IS researchers to adequately frame their research in this rich and under-examined area.

References


