

This paper appears in *Managing Modern Organizations Through Information Technology*, Proceedings of the 2005 Information Resources Management Association International Conference, edited by Mehdi Khosrow-Pour. Copyright 2005, Idea Group Inc.

Analysis of the Dimensions Involved in IT Evaluation

Cláudia Aparecida de Mattos and Fernando José Barbin Laurindo

Production Eng. Dept of Polytechnic Eng. School, University of São Paulo, Av. Prof. Almeida Prado, 128 Tr.2 Biênio 2º, 05508-900, São Paulo - SP - Brazil, claudia.mattos@poli.usp.br, fjblau@usp.br

INTRODUCTION AND OBJECTIVE

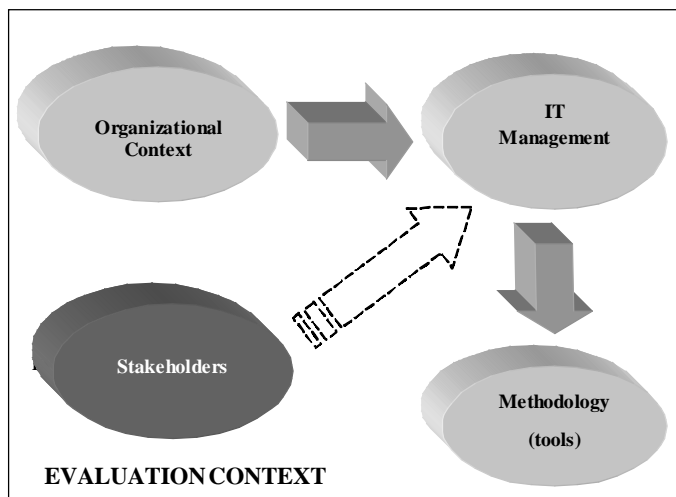
According to Smithson & Hirschheim (1998), due to pressures to implement costs reduction and improve the quality of products and customer services, the organizations have been facing the need to revise their processes and to transform their business models. Therefore, information technology (IT) has assumed an important role within the organizations, in terms of creating the conditions to the viability of these requisites so that the organization can strive to and maintain its competitiveness. Thus, it has been observed that the organizations make high investments in IT, and these investments have been increasing mainly due to the Internet.

The present study aims to discuss aspects related to the evaluation methodologies that are critical for evaluation success. Many researchers (for example, Symons, 1991; Farbey et al, 1993; Walsham, 1993; Willcocks and Margetts, 1994; Serafeimidis, 1997; Smithson & Hirschheim, 1998; Ross & Beath, 2002; Irani & Love, 2002;) have discussed that a successful evaluation requires a detailed analysis of the organizational situation.

The evaluation context (Figure 1) of a new IT application includes the characteristics of the organizational context, of the IT management and the parties involved (stakeholders), because it is fundamental to take into account the affected parties and to understand their roles during the evaluation.

This article reviews the literature referring to the aspects involved in the process of investment evaluation and tries to analyze similar aspects in practice, through the analysis of a case study where a significant investment in IT is observed. The last section discusses theory and practice, in an attempt to enrich the understanding of IT evaluation (and its methodologies) as an organizational practice.

Figure 1. Dimensions Involved in the Context of IT Evaluation



THEORETICAL FRAMEWORK

Organizational Context

The first aspect to be analyzed is the organizational context. Laurindo et al. (2003) relates Information Technology to the strategy and operation of the company's business based on two works: McFarlan's (1984) strategic grid and the information intensity matrix proposed by Porter & Millar (1985).

McFarlan (1984) mentions that the strategic grid allows to analyze the impact of current and future IT applications on the company's business. The grid is divided into four quadrants, each one representing a situation to the organization: Factory, Support, Turnaround and Strategic.

Different authors has used the Strategic Grid to classify IT role in the organizations and associate different practices of evaluation and selection of IT applications according with this classification, like Jiang & Klein (1999).

When the issue of alignment between business and IT is discussed, the Model proposed by Henderson & Venkatraman (1993) is useful. This Model attempts to structure the issue of Business and IT alignment taking into account internal factors (company's administrative structure) and external factors (the market and the company's decisions regarding how to operate in this market).

According to the authors mentioned above, alignment is based on four important factors: Business strategy, IT Strategy, Business infrastructure and IT Infrastructure

IT Management

According to Venkatraman (2002), the IT area has always been seen as a cost center and not as a unit that generates income. Nowadays, executives are facing the need to promote a change in thought, as they need to demonstrate the value of IT for the business.

Venkatraman (1998) mentions the need to develop a logic to recognize IT rules as part of business operations, not only an operational tool.

In this context, Venkatraman (1998) suggests the concept of Value Center, which is composed of four independent centers – each one represents different ways of extracting value from IT resources.

The Cost and Service Centers attempt to minimize the risk focusing on the current businesses, and the Investment and Profit Centers focus on maximizing the opportunities made viable by IT resources. The Value Center tries to balance the business' current operational requisites with the requirement to create a business model in the future.

Venkatraman (1998) highlights the third component of the Value Center: the Investment Center. This has become important nowadays because, unlike the two first centers, the Investment Center has a future orientation. One of the points highlighted by the author is how much to invest.

The Investment Center involves allocations based on a strategic redirection and innovations in the business. Venkatraman (1998b)

mentions that the Investment Center will benefit the adoption of a method such as Real Options, as opposed to the traditional Cash flow, which focuses on the Service and Cost Centers. Venkatraman (1998) states in his article that one of the key dimensions for a Value Center profile to the organizations would be the performance metrics. Within the component Investment Center, what should be taken into account is the Efficacy of the Investment Portfolio, based on financial and qualitative criteria.

Evaluation Methodology

According to Smithson & Hirscheim (1998), IT evaluation research has advanced with new approaches and techniques that have been emerging in the literature, together with the continuous development of traditional approaches. The authors also state that advances in research on new methods and changes in the organizational context generate the need for a critical look at the theory and practice of IT investment evaluation.

Critics of the traditional financial evaluation methods (like Pay-back, Internal Return Rate; Net Present Value) argue that this method does not allow managers to make important strategic decisions (Hayes & Garvin, 1982).

Although there is a series of models, what can be observed is that they are complementary and are proposed according to the evolution of new technological trends.

In this context, it becomes important to analyze Evaluation models that oppose the traditional methods, allowing establishing a link between businesses and IT investments. Among them, it is important to highlight the Options method.

The options theory is a theoretical model generally used in the financial area with the objective of pricing an option in the derivatives market. Option is a right, not the duty, to take an action in the future (Amram and Kulatilaka, 1999). Options have value when there are uncertainties. The Theory of Real Options is characterized by the introduction of simplified and robust mathematical models that allow the use of the theory in varied themes and in different industry segments, always with the aim of valuing assets, including projects and projects portfolios, or even an entire company (Copeland et al, 2000; Biellosi, 1996).

Yeo & Qui (2003) give some (illustrative) examples of IT investments and the related options. Firms generally invest in two types of technology options: growth (strategic) options and flexibility options.

According to Luehrman (1998), the Options approach allows the incorporation of the uncertainties inherent in the business and help the executives think strategically, capturing the "value" of a project.

Thus, in this paper, the Strategic Grid (McFarlan, 1984) allows to understand the strategic role of IT in the organization, while the Strategic Alignment Model is used to analyze how IT and business strategies were managed in a coherent process. Venkatraman (1998) was the base for studying IT management approach in the case. Finally, the different evaluation models (like Luehrman, 1998) were the basis for the investigation and analysis of the company evaluating process.

CASE STUDY AND RESULTS

The problem of the present study was investigated through a Qualitative Research approach and the method used was Case Study (Yin, 1991; Claver et al., 2000).

The case selection criteria were: the existence of an expressive IT projects based on the Internet and the presence of a formal process for selecting IT projects.

Interviews were carried out with at least three professionals from the company (CIO, project managers and executives from the business area), based on the established script. However, during the interviews, we tried to obtain, through the conversation, more subsidies for the qualitative analysis of the case.

Case Background: Company X

The studied case is as a commercial bank that is part of a diversified group and that have been obtaining important results in their operation segments: Asset Management, Insurance, Pension Funds, Capitalization. The company has 800 employees and 300 offices.

The IT area became independent of the Bank in 2002. Nowadays, it provides services for the bank, other companies of the group and for the market. The IT organization has today 78 employees, and is divided into three areas: *Infrastructure, Projects specification and approval, and Development.*

One of the main investments in IT in the last years has been the Internet. These investments in the Internet started in 1997 and a special group was appointed to work in this project. The main objectives were the development of infrastructure focusing on the electronic commerce market, ASPs and the creation of the corporate portal. The bank's Corporate Portal begun its operations in 1999 and since then has been significantly improved.

The organization's current focus is on products development (securities management, treasury system, applications for the insurance area) having the WEB as basis.

The decision regarding IT investments of the studied organization is part of the general budget process of the Holding. The IT projects are submitted to an executive committee composed of the Director of the Operations area, CIO, Project manager and CFO.

The real value of the process adopted by the organization lies in requiring that the executives detail how the project will add value to the business. According to the manager of corporate information systems, approximately one third of the projects is eliminated because their sponsors cannot or do not want to defend them.

Understanding the IT Evaluation Methodology of Company X

Analyzing the role of IT in the studied organization, it is possible to verify that the IT applications are critical for the existing operations, and planned IS uses are critical for future success, which allows to classify the organization in the strategic quadrant in the strategic grid (McFarlan, 1984). It can be also observed the prominent position of CIO in the organization's hierarchy, where the CIO reports to the group's Director of Operations. It is also possible to observe that the IT investments are directed to achieve the organizational goals, searching for innovations in products and services.

The adherence of the model proposed by Henderson & Venkatraman (1993) to the practice can be verified in this case study. The model introduces the concept of alignment as a set of relationships between strategies and structures. Analyzing company X, it is possible to state that a movement in this direction is observed, through the interviews that were carried out and due to the fact that the company considers the form of management by processes a critical factor for the successful adoption of new technologies. As mentioned during the interviews, the initiatives of investments were taken mainly by the IT area. The CIO strengthens the importance of managing the IT area taking into account internal factors (company's administrative structure) and external factors (the market and the company's decisions regarding how to operate in this market). Comparing with the model of Value Center proposed by Venkatraman (1998), it is possible to see that the company created a concept of Profit Center, that is, it started focusing on the market, providing products and services for other banks and also for customers from other segments. Currently, this unit is also dealing with international projects.

Still regarding the Value Center model, the approach referring to the Service Center can also be associated with the management system of the company in focus. According to the Model, the block of the Service Center aims to use the IT applications to create business capacities to support the business strategy.

It is worth highlighting that this commercial view of the IT area provides an advantage for IT management, affecting directly the process of

evaluation of the investments made. What can be observed is that company X was able to incorporate important elements into IT management, as listed below:

- A more commercial relationship with internal customers
- Contribution to the solution of the business challenges
- Measurable contribution to the business' value chain
- Provision of Services x Delivery of Products

These elements, incorporated into the company's IT management, allowed a better definition of the criteria established for the decision-making process and a structured decision-making process.

Company X has a structured process for choosing technology projects, including the gathering of information about the project – such as cash flow, return on investment, interfaces, questions regarding adequacy to infrastructure, and information architecture on the part of business and IT professionals. The company uses the system to attribute a score to each project, based on benefits and costs.

The main decision criteria pointed by the Projects Manager (e-business) to investments in projects, mainly to WEB projects, are:

- Flexibility and low cost in the implementation of branches;
- Reduction in back-office;
- Re-utilization of workflow in the creation of new businesses;
- Technological question – new technologies.

Company X adopts PMO (Project Management Office). The company's CIO explains that PMO is a general secretary in the service of the shareholders. He even controls the activation of a data communication link, and knows whether the projects are within deadlines, scopes and costs.

Analyzing the organization, it is possible to verify that the theme Evaluation is being perceived as the mechanism to identify IT contribution to the business. Consequently, business values related to vision and strategic goals are the main drivers in the conceptualization of IT evaluation. The evaluation criteria and the measure mechanisms were developed along this line. The interviews revealed a significant effort to introduce intangible and strategic considerations. The consideration of intangible benefits, as well as the risk elements associated with project delivery and benefits delivery, are the most innovative ideas introduced in the evaluation culture of company X.

CONCLUSIONS

This article discusses, through a case study, the influence to which the evaluation methodologies are subjected. The available methods originated from functional/technical and/or economic/financial paradigms. Their limitations are related to the limited importance given to the understanding of the total context of the organization, to IT management and to the stakeholders.

Due to the characteristics of the studied company, it is verified that the choice of criteria is based on the context of the organization and it is its management form that makes the company adopt an analysis carried out after the implementation of its projects. It is worth mentioning that viewing the IT area as a Value Center provides an advantage in its management, affecting directly the process of evaluation of the investments that were made.

The case study strengthens the idea supported by many researchers: a successful evaluation requires a detailed analysis of the organizational situation, because the company in question reveals success data (in terms of productivity increase) in relation to the implemented IT projects. The evaluation success may be linked with the fact that the methodology is integrated into the organization, the processes and the IT management. In this context, the study indicates the organization's compatibility with the Model of Strategic Alignment proposed by Venkatraman (1993).

The discussion of evaluation methods is a broad theme that involves other dimensions. This shows that evaluation methodology needs to be incor-

porated into other practices (financial investment evaluation, information systems planning, projects management, systems development).

The adaptation of tools and techniques to the evaluation environment, aspects concerning the organization and IT management become fundamental elements to be considered to successfully develop and implement IT evaluation practices.

As regards the adoption of new methodologies, such as the Method of Options, what was observed in this case was that the stakeholders' private power seemed to be the main reason for not adopting new methodologies. The findings of a case study cannot be generalized, but the gap between theory and practice can be recognized and the explanation given is intuitively plausible. The local analysis of the stakeholders is, therefore, an important point in the success of the integration of an IT evaluation methodology.






Finally, in order to obtain an improvement in the evaluation of investments in IT applications, it is necessary to gain knowledge and insight in different aspects. It is important to have a clear view of the relevance of the evaluation criteria, of the circumstances in which these criteria are used and how they are inserted in the evaluation process. The analyzed case indicates that the content of the adopted evaluation is directly related to the context and to the evaluation process present in the organization.

REFERENCES

- AMRAM, M; KULATILAKA, N. Real Option, Managing Strategic Investment in an Uncertain World. Cambridge, H.B.S Press, 1999.
- BLACK F AND SCHOLLES M The pricing of options and corporate liabilities, Journal of Political Economy, Vol. 81, No. 3, 637-654 May/June, 1973.
- CLAVER, E.; GONZALEZ, R.; LLOPIS, J. An analysis of research in information systems (1981-1997). Information & Management, v.37, n.4, p.181-195, Apr., 2000.
- COPELAND, T., KOLLER, T., MURRIN, J. Valuation - Measuring and Managing the Value of Companies, John Wiley & Sons (Ed.), 2000
- FARBEBY, B.; LAND, F. F.; TARGETT, D. IT Investment: A Study of Methods and Practices. Management Today and Butterworth-Heinemann LTD, UK. 1993.
- HAYES, RH and GARVIN, D.A "Managing as if tomorrow mattered" Harvard Business Review – pgs 71-79 May-June, 1982.
- HENDERSON, J.C.; VENKATRAMAN, N Strategic Alignment: Leveraging Information Technology for transforming Organizations. IBM Systems Journal . v32 ,n.1 p. 4-16. 1993.
- IRANI, Z. & LOVE, PED. Developing a frame of reference for ex-ante IT/IS investment Evaluation. European Journal of Information Systems, v.11, p.74-82, 2002.
- JIANG, J.J.; KLEIN, G. 'Project selection criteria by strategic orientation'. Information & Management, v.36, p.63-75., 1999.
- LAURINDO, F. J. B.; CARVALHO, M. M.; SHIMIZU, T. 'Information Technology Strategy Alignment: Brazilian Cases'. In: KANGAS, Kalle. (Org.). Business Strategies for Information Technology Management. Hershey, p. 186-199., 2003.
- MCFARLAN, F. W "Information technology changes the way you compete" Harvard Business Review – pgs. 98-103- May-June, 1984.
- ROSS, J.W.; BEATH, C.M. Beyond the Business Case: New Approaches to IT Investment. MIT Sloan Management Review, Winter, p.51-59, 2002.
- SERAFEIMIDIS, V. AND SMITHSON, S Interpretive information systems evaluation in practice: Experience from a case study. Computing Science Report Series No: CS-98-01, Department of Computing, University of Surrey. (1998)
- SMITHSON, S AND HIRSCHHEIM, R Analysing information system evaluation: another look at an old problem- European Journal Information System , 7, pgs 158-174. 1998.
- SYMONS, V.J. A review of information systems evaluation: content, context and process. European Journal of Information Systems, 1 (3), 205-212. (1991).

Table 1. Summary of the Case Study Analysis

Summary: Main Points Analyzed in the Case Study According Theoretical Framework

Characteristics	Company X
<p>Role of IT – Based on McFarlan’s Model (1984)</p> 	<p>Strategic – IT plays a role that affects current and future situation. Analyzing the role of IT for organization X, it is verified if the applications of IT are critical for the existing operations, and if the planned utilization are critical for the future success, what allows to classify the organization it in the Strategical quadrant, in the Strategical Grid (McFarlan, 1984). It can be observed the prominent position of CIO in the organization’s hierarchy, where the CIO reports to the group’s Director of Operations.</p>
<p>Alignment between IT and Business – Model proposed by Henderson & Venkatraman (1993)</p> 	<p>Scenario of alignment, integration business-IT and Processes</p> <p>It is necessary to emphasize the importance of the definition of the business-oriented processes on the part of the studied organization, which redesigned its process business, exploring the relation between IT and Business Process.</p>
<p>IT Management (Venkatraman, 1998)</p> 	<p>Indicates adherence to the theory, presenting characteristics of Value Center According to the Venkatraman’s the model of Center of Value, can be observed that the company created a concept of Center of Profits, or either, it started to also have a focus for the market, supplying products and services other banks and customers of other segments.</p>
<p>Evaluation Processes/Applied Methods</p> 	<p>Formalized process / Elaboration of Business Plan for some projects – analysis after the implementation of the projects.</p> <p><u>Decision criteria</u> Flexibility and low cost in the implementation of branches; Reduction in back-office; Re-utilization of workflow in the creation of new businesses; Technological question – new technologies Net Present Value</p> <p><u>Tools/Methodologies</u> The company does not employ methods based on the literature review – it uses a multi-criteria method defined internally and does not have a risk evaluation model</p>
<p>Decision level/actors involved in the decision-making processes</p> 	<p>Decisions are made by an Executive Committee – the CIO has a strong and important role in the decision-making process</p>

VENKATRAMAN, N Beyond Outsourcing: Managing IT Resources as a Value Center – MIT Sloan Management – 2002.
 VENKTRAMAN, N – IT AGENDA 2000: Not Fixing Technical Bugs but Creating Business Value – European Management Journal Vol 16 N. 5 October, 1998.

YEO, K.T AND QIU, FASHENG The value of management flexibility– a real option approach to investment evaluation International Journal of Project Management -Volume 21, Issue 4 , Pages 243-250- May 2003.
 YIN, R. Case study research: design and methods. Newbury Park. Sage Pub, 1991.

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/proceeding-paper/analysis-dimensions-involved-evaluation/32561

Related Content

Conceptual Foundations for Interactive Programming Activities with the Conjunction of Scratch4OS and Open Sim

Pellas Nikolaos (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 4776-4786).

www.irma-international.org/chapter/conceptual-foundations-for-interactive-programming-activities-with-the-conjunction-of-scratch4os-and-open-sim/112922

Radio Frequency Fingerprint Identification Based on Metric Learning

Danyao Shen, Fengchao Zhu, Zhanpeng Zhang and Xiaodong Mu (2023). *International Journal of Information Technologies and Systems Approach* (pp. 1-13).

www.irma-international.org/article/radio-frequency-fingerprint-identification-based-on-metric-learning/321194

Change Management: The Need for a Systems Approach

Harry Kogetsidis (2013). *International Journal of Information Technologies and Systems Approach* (pp. 1-12).

www.irma-international.org/article/change-management/78903

Status of University Libraries in India

Mayank Yuvaraj (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 4911-4919).

www.irma-international.org/chapter/status-of-university-libraries-in-india/112938

Random Search Based Efficient Chaotic Substitution Box Design for Image Encryption

Musheer Ahmad and Zishan Ahmad (2018). *International Journal of Rough Sets and Data Analysis* (pp. 131-147).

www.irma-international.org/article/random-search-based-efficient-chaotic-substitution-box-design-for-image-encryption/197384