

A STRATEGIC COMPREHENSIVE FRAMEWORK FOR EVALUATING IS INVESTMENTS

- a proposed checklist for evaluating E-Business investments

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Abstract: Because of the strategic importance of IS investments, it is essential to incorporate in strategic IS management effective managerial evaluation practices. Therefore this paper aims to develop a checklist for comprehensive evaluation of e-business (EB) investments as a part of strategic IS management. An IS (investment) plan is considered as a contract between involved internal stakeholders like department managers and external stakeholders like customers and suppliers. In the evaluation of investments we have to consider the variety in their impacts on objectives and interests of stakeholders. Therefore this checklist is based on six different foci on IS investments. Firstly, from an internal perspective, we distinguish the IS cost savings focus, the management information quality focus and the strategic alignment focus. Secondly, from an external perspective, we distinguish the IT infrastructural platform focus, organisational transformation focus and business scope redefinition focus. The checklist is elaborated for an EB investment evaluation.

1. INTRODUCTION

Our research objective is formulated and the structure of the paper is presented.

1.1 Background

In this paper e-business (innovation) is considered as:

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“A general (innovation) concept covering the application of IT for transforming any form of business transactions between stakeholders such as customers, suppliers and other partners by adoption, implementation and institutionalisation of information systems (IS)”.

Companies are becoming aware of the many potential benefits provided by e-business such as lower data communication costs (using the inexpensive internet infrastructure), cost reductions through deployment of electronically supported transactions, strong relationships with customers and suppliers and expansion of the market reach that goes beyond any border. Because of the intangible nature of some of the benefits it is difficult to evaluate the e-business investments and to manage these projects ensuring that real profits are realised (Giaglis et al., 1999, Kettinger et al., 1995). The impression is that in practice e-business projects are often managed too technically and little attention is paid to the business case. The practical need for evaluating and measuring e-business performance is confirmed by a field study in bricks-and-mortar, click-and-mortar and dot.com firms. (Adams et al., 2001).

1.2 Aim and structure of the paper

To summarise, because of the strategic importance of EB investments and the high risks, it is essential to have effective managerial practices for IS investment evaluation (Van der Zee, 1999). In IS WORLD, IS researchers have identified strategic management, assessment and evaluation of e-business as the two most important research questions in the near future. Till now, IS research is studying too often strategic planning and evaluation of IS investments as two separate topics. However, there is a strong relation between these two topics. Therefore, we will consider evaluation as an integrated part of strategic IS management. In previous work we developed an eclectic strategic management concept (Wassenaar and Gregor, 2001). This concept recognises explicitly that many stakeholders are involved in IS planning. Thus a number of questions have motivated this paper. How should we evaluate e-business investments (innovations) as integrated part of strategic IS management? What can we learn from past IS evaluation research? How can we integrate existing IS evaluation and strategic IS management knowledge for improved e-business investment evaluation? Our ultimate research (on-progress) objective is:

To develop a comprehensive framework and a checklist for IS investment evaluation as an integrated part of strategic IS management.

Section 1 introduces the subject, aim and structure of the paper. Section 2 presents a generic strategic evaluation model and a historical review of the

existing evaluation literature. Section 3 introduces a framework for evaluating IS investments elaborated in an EB investment evaluation checklist. Finally, section 4 gives some conclusions and final remarks.

2. THEORETICAL BACKGROUND

We explore the concept of evaluation resulting in a general strategic evaluation model and present an historical overview of the IS investment evaluation literature.

2.1 A generic strategic evaluation model

Our generic model (figure 1) is based on the EMIOS framework (Wassenaar and Gregor, 2001) encompassing a constellation of stakeholders with partly overlapping, and partly conflicting interests, interacting in:

- an intervening mode by implementing (development, conversion, testing and acceptance) and institutionalising (use, maintenance and continuous improvement) of an agreed (portfolio of) IS investment in the realisation system and
- a reflecting mode by planning (contracting) common objectives and allocation of resources (IS investments plans) of stakeholders and evaluating courses of actions (IS
- investments) in the planning and evaluation system.

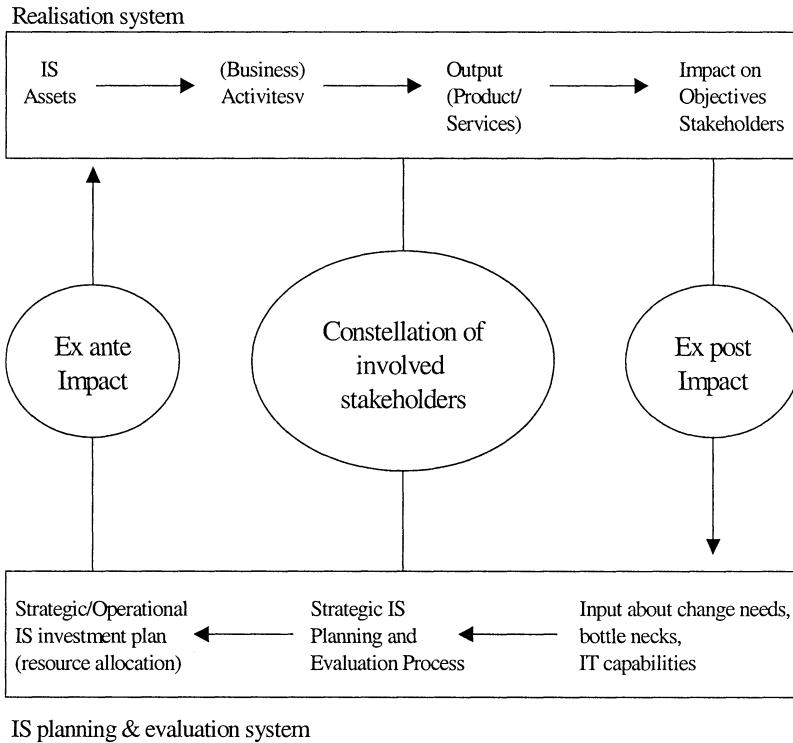


Figure 1. Generic Strategic Evaluation Model

Strategic IS management behaviour is exposed (formed) in the realisation system and reasoned (formulated) in the planning and evaluation system. IS evaluation is considered as an integrated part of the reasoning. IS investments are affecting enterprise IS assets, and enabling improved business activities resulting in improved or new products and services impacting interests and especially costs and benefits of the involved stakeholders like managers, customers, suppliers, employees and shareholders. The IS investment plan is considered as a contract between involved stakeholders. Based on Farbey et al. (1999) IS evaluation is defined as a process that takes place at different points in time or continuously for searching and making explicit, qualitatively or quantitatively, ex ante or ex post, impacts of IS investments and their risks for all involved stakeholders (in the realisation system).

Ex ante evaluation is mostly defined as an appraisal of investments in future information systems aiming a selection/ranking of one of the several (portfolio) alternatives and establishing expectation measures or performance metrics for the future. Ex post evaluation is defined as assessment of investments in current information systems at different stages in their life cycle: during implementation (on portfolio, programme, project/subproject level) and institutionalisation (on level of application, IT function, enterprise, stakeholder, industry and economy as a whole).

2.2 Historical overview IS evaluation literature

Our review is based on Van Reeken (1995) identifying different stages in IS investments and their different impacts in organisations. We prefer to speak about different evaluation foci divided after an internal, IS oriented, versus an external oriented perspective.

2.2.1 Internal, IS oriented, perspective

This perspective is starting from (1) the existing information and accounting information systems function (IS cost savings focus) (2) the existing decision making and business processes (management information quality focus) and (3) the existing business strategy (strategic alignment focus). Because the existing internal IS situation of the firm is the starting point for evaluation we will label this perspective as the "inside-out" approach.

1. The (first) automation stage during the fifties and sixties, or what we will call the IS cost savings focus, refers to computers which were used to automate administrative work in isolated operational business functions done by hand like registration and calculation. Consequently, these investments should be evaluated on their improvements in efficiency (especially of the IS function) and their technical IT risks. The financial criteria based methods for evaluating direct financial tangible cost savings embraces financial oriented techniques like (1) the pay back period, (2) average return on investment (ROI), (3) net present value and (4) internal rate of return.

2. The (second) informatisation stage during the seventies, or what we call the management information quality focus, computers were used not only to automate existing work but also to support decision-making processes by management information systems. Galbraith (1974) is relating management information capacity, decision-making quality and their impact on business process performance. Investments in (management) information processing capacity can improve decision-making quality and (indirectly)

business processes and their performance. Therefore these types of IS investments should be evaluated on their tangible and intangible impact on business processes and their performance. The (specification) risks of these IS investments depends on the possibility to specify unambiguous the decision making process and especially the decision algorithm character (routine or heuristic), decision frequency and the degree of formalisation of language. Parker, Benson and Trainor (1988) presented new techniques for evaluating indirect tangible benefits like value linking and value acceleration based on Porter's value chain concept. So, they explore the value of IS investment in terms of their implication on (operational) decision making quality and impact on business process performance. Bedell (1995) faces in his multi-criteria based method the problem of intangible benefits by suggesting a ranking and scoring system for evaluation and prioritisation relating the contribution and importance of IS investments. Strassman (1990) evaluates management and information activities and their added value to the company.

3. In the third strategic information systems stage during the eighties, partly parallel with the informatisation stage, emerged the strategic alignment focus (Earl, 1989) oriented on the appraisal of strategic information systems (SIS) to support the existing business strategy. Strategic IS planning methods were introduced in order to align (top down) IT with business (unit) strategy. So, strategic alignment implies that IS investments have to be evaluated and justified on their increased competitive advantages and competitive risks. Many authors (see for an overview Earl, 1989) classified SIS (based on the concept of Porter, 1980) after their influence on the five competitive forces and impact on (sustainable) competitive advantage. However many of the competitive risks are exogenous, uncontrollable and are of a temporal nature because these systems are imitated by their competitors (Jurison, 1996)

2.2.2 The external oriented perspective

This perspective is rooted in the need for radical improvement of enterprise responsiveness in a fast changing dynamic environment. Therefore we distinguish based on Ansoff and Brandenburg (1971) and Volbeda (1998) (1) the IT infrastructural platform focus aiming operational or technical responsiveness, (2) the organisational transformation focus aiming organisational responsiveness and (3) the business scope redefinition focus aiming strategic responsiveness. Because this perspective starts from the external turbulent environment of the firm, we will label it as the "outside-in" approach.

4. At the end of the eighties/beginning of the nineties, with phenomena like outsourcing and insourcing of parts of the IS function emerged the stage of anticipating on the future by IT infrastructure or what we will call the IT infrastructural platform focus. Enterprises recognised that they had an insufficient insight in the future. Therefore they could use an IT infrastructure in order to anticipate and create more flexibility just like buying an option. According to Saaksjarvi (2000) corporate IT infrastructure consists of IT components like common hardware, software, communication technology, databases and standards providing the base for shared services between a large range of business applications. It differs from business applications because it serves a shared and common enabling foundation for the future applications and services of all business units. However these IS investments in infrastructure are very difficult to justify, it is more a formulated general policy than a calculation of costs and benefits. Saaksjarvi (2000) suggest to evaluate these type of IS investments on their compatibility with new technologies and applications of external vendors, connectivity with emerging (future) suppliers, customers, strategic partnerships and other collaborative networks. Other evaluation criteria suggested in literature (Duncan, 1995; Van Grembergen et al. 2002) are on time deployability for shortening the development and implementation cycle of new applications, accumulation capability of technical skills which makes the imitation of the infrastructural services difficult, and portability which is defined as the degree to which resources are sharable and reusable across the enterprise.

5. In the business process reengineering (BPR) stage during the nineties, partly parallel with the IT infrastructure stage, emerged what we will call the organisational transformation focus. IT was considered as an enabler for total business performance and quality by organisational transformation. The first category of a business process reengineering projects like ERP systems are oriented on horizontal value chain restructuring by eliminating time lags and costs of intermediate stocks in the (primary) activities. Another category is oriented on the vertical management (command and control) chain restructuring by downsizing, eliminating managerial levels, and empowerment. Their ultimate goal was improving organisational responsiveness on the fast changing customer needs. IS is not any more an isolated factor but becomes one of the organisational design variables, just like task division, organisational department structure and overall planning and coordination structure (Lucas, 1995). Evaluation of these IS investments regards the impact of the whole transformed organisational form on organisational responsiveness and their change/implementation risks. Therefore, these investments have to be evaluated by general business

performance measurement methods like Balanced Scorecard (BSC) launched by Kaplan and Norton (1992,1996) the total quality management oriented EFQM model (Hardjono, 1993) and learning models (Argyris and Schon, 1978; Senge, 1990).

6. In the middle of the nineties, with phenomena like WWW, Internet and E Commerce emerged the stage of reinventing business or what we call the business scope redefinition focus (Venkatraman, 1994). Firstly, IS investment are initiating new product/market combinations, extending the business scope by offering new products to existing markets or offering new or existing products to new markets by using electronic channels (Hoogeweegen et al.1998). Secondly, IS investments aim to create a new business network of cooperating companies restructuring the existing industry. The ultimate goal is improving strategic responsiveness in a fast changing turbulent environment. These investments have to be considered in the context of the often information intensive products in IT based industries like the publishing, banking and insurance sector and has to be evaluated on their strategic responsiveness and their strategic risks.

3. A COMPREHENSIVE IS INVESTMENT EVALUATION FRAMEWORK AND AN E-BUSINESS INVESTMENT EVALUATION CHECKLIST.

We are developing a comprehensive evaluation framework, which is elaborated in a e-business investment evaluation checklist.

3.1 A comprehensive IS evaluation framework

This framework is combining the generic strategic evaluation model, distinguishing three objects in the realisation system and the distinguished internal and external oriented foci identified in the historical overview. Riggins et al. (2001) suggest a similar framework for EC applications, but is limited to internal issues such as efficiency benefits (our cost saving focus), effectiveness benefits (our management information quality) and strategic benefits (our strategic alignment focus). Especially in the turbulent era of e-business, a more external oriented perspective has to be added. Therefore we propose in figure 2 a comprehensive IS evaluation framework especially for e-business investments based on the combination of the internal oriented foci (inside-out approach) and external oriented foci (outside-in approach).

Object Approach-Foci properties	IS assets (Configuration)	Business/ decision activity structure	Output product/ service portfolio
Inside - out			
Focus	Cost saving	Management Information Equality	Strategic alignment
Type of investment	Automation IS function	Informalization processes value chain	Strategic Information Systems (SIS)
Aimed impact	Cost savings Existing IS function	Benefits improved process equality	Competitive position (advantages)
Uncertainty	Technical risks	Process modeling risks	Competitive risks
Outside - in			
Focus	IT infrastructural platform	Organisational transformation	Business scope redefinition
Type of investment	Infrastructural reengineering	Business process reengineering	Business network reengineering
Aimed impact	Technical responsiveness	Organizational responsiveness	Strategic responsiveness
Uncertainty	Technical risks	Change/ implementation risks	Entrepreneurial interorganisational risks

Figure 2. A Comprehensive IS Evaluation Framework

3.2 An e-business evaluation checklist

Our framework will be elaborated in a EB investment evaluation checklist, consisting of a set of evaluation issues especially for EB investments.

3.2.1 Inside-out approach.

In this "inside-out" approach, the starting point is the existing IS situation of the firm.

IS cost savings focus:

The central question is: What are the impacts of EB investments based on a cost savings perspective derived from improvement of total costs of ownership and the generated cash flows (revenues and expenditures) of the IS function?

The checklist for evaluation of EB investments from a cost savings point of view explores the impact on the IS expenditures during the defined life time for the following categories:

1. Hardware (processing, storage, data communication, in/output devices, fall back facilities) and their operating expenditures (including basic facilities, maintenance, insurances and supplies) based on an estimated service level;
2. software expenditures based on the initial cost, expected future releases and yearly software maintenance and optimisation expenditures based on estimated (increasing) number of users and features;
3. additional expenditures for training, support and IT management.

The cost savings are the result of the comparison of the costs in the old and new situation assuming the same service/performance levels for availability (average system availability, average downtime, maximum downtime) security and safety. Some general investments in overall supporting hard-, soft- and knowledge-ware are joint costs which has to be distributed to IS systems for different stakeholders.

Management information quality focus

The central question is: What are the impacts of EB investments based on the management information quality perspective derived from improvements of business process performance and their underlying decision making quality?

The checklist for evaluation of EB investments from a management information quality point of view explores for each business process in the value chain the impact on the direct and indirect tangible and intangible benefits of the involved stakeholders. Examples of tangible benefits are lower inventory cost and production costs (resource utilisation, less reruns) by improving operational planning, coordination and logistic decisions and lower cost of (working) capital by faster invoicing and lower stocks. The indirect benefits can be traced by value linking (improvement of the billing process makes it easier for sales to identify credit risks of customers) and value accelerating techniques (speed up the billing process can result in a one time accelerated benefit of interest expense savings).

Strategic alignment focus

The central question is: What are the impacts of EB investments based on a strategic alignment perspective derived from improvements of sustainable competitive advantage of the existing business strategy by strategic information systems?

The checklist for evaluation of EB investments from a strategic alignment point of view explores the impact on the sustainable competitive advantages (rooted in the existing business strategy) by assessing the following issues (Rangone et al. , 1999):

- level of bargaining power towards suppliers and customers;
- position competitors in relation to the possibility for new business models based on on-line trading;
- level of internal rivalry, competitors strengths and weaknesses and the underlying competitive advantage by looking at determinants like market growth rate, level of concentration, competitive diversity, fixed costs/added value ratio, product differentiation and brand identity and at direct and indirect competitors and their marketing mix embracing place (site), product/service, price, promotion and delivery and virtual community;
- level of existing barriers and threat of new entrants by examining determinants like economy of scale (critical mass of customers and/or suppliers), loyalty building, brand identity, cost of switching, cost advantages, capital requirements, access to distribution channels and strategic alliances;
- threat of substitution traditional channels by electronic channels (inter channel competition)

This part of the checklist can be used especially for a more detailed evaluation of the “strategic importance” of EB investments, which is often a general justification statement without any further argumentation.

3.2.2 Outside-in approach

This “outside-in approach” is rooted in the need for enterprise responsiveness in a dynamic environment and has its starting point in innovation of the firm.

IT infrastructural platform focus

The central question is: What are the impacts of EB investments from a IT infrastructural platform perspective derived from improvements of firm’s technical responsiveness in a dynamic technical IT environment by an IT infrastructure?

The checklist for evaluation of EB investments from an IT infrastructural point of view has to explore the impact on technical responsiveness and flexibility by assessing the following topics:

- portability (compatibility) or the degree to which IT resources are sharable and reusable across the enterprise by standardising their web services and used tools;

- connectivity or the degree to which IT resources enable interaction across the enterprise and their (future) partners like customers, suppliers and strategic partners;
- deployability or the implementation time for integrating new emerging technology and standard applications and tools in the existing technical infrastructure;
- scalability or the degree to which the infrastructure is capable to process a strong growth in transactions;
- accumulation capability or the capability of integrating technical skills across the enterprise which gives added value to infrastructural services and makes it difficult for imitation by competitors.

Organisational transformation focus

The central question is: What are the impacts of EB investments from an organisational transformation perspective based on improvements in organisational responsiveness in a dynamic environment by organisational transformation?

The checklist for evaluation of EB investments from an organisational transformation point of view has to explore the impact on the overall organisational quality and responsiveness by assessing the following topics

- customer satisfaction in general and especially (1) cycle time defining the company's ability to satisfy customer requirements including new product development cycles, order to delivery cycles and service cycles (2) quality, including both product and service quality and (3) service levels, including levels of customer satisfaction as determined by opinion surveys:
- business process quality and especially the value drivers in four basic processes product design, product development, manufacturing/building and marketing (BSC framework) or in the enabling processes (EFQM framework): leadership, resource management, people management, policy and strategy and the (primary) processes. For each of these identified processes should be explored how they affect customer satisfaction, measured in three ways: cycle time, quality and productivity;
- organisational learning and sustaining innovation, change and improvement by looking after (1) the capability for market innovation (introducing continuously new products and services), (2) continuous improvement by measuring the rate of improvement in performance over an extended period and (3) intellectual capital (human resources) by measuring the importance of knowledge workers and their contribution or added value to company's revenues;
- shareholders value by analysing the profitability and value of the firm based on the shareholder value principle but also explicitly the value gaps

in the belief that, if management does not recognise and deal with them, then other actors in the marketplace will.

Business scope redefinition focus

The central question is: What are the impacts of EB investments from a business scope redefinition perspective based on improvements in strategic responsiveness in a dynamic environment by a reengineering external relations (business networks)?

The checklist for evaluation of EB investments from a business scope redefinition point of view explores the impact on strategic responsiveness by assessing the same topics of above mentioned strategic allignment focus but then regarding the new defined business (network) strategy.

4. CONCLUSION AND FINAL REMARKS

4.1 Conclusions

This research is based on the assumption that strategic IS management can be more effective by integrating managerial evaluation practices in strategic IS planning. Many impacts of EB investments are uncertain and difficult to quantify. However in a first preliminary review of this checklist in a few cases, it seems useful that the impacts have to be described and debated from different viewpoints. A special problem in EB investments are the distribution of the costs and benefits over the involved stakeholders. Often is the case that costs are displaced from one stakeholder to another stakeholder. Further the distinction between the organisational transformation and business redefinition focus was not clear for practioners. One of the suggestions was that business scope redefinition has to be broadened to network redefinition embracing EB investments in collaboration of organisations in virtual networks aiming cooperative and not competitive advantages. The checklist requires a time consuming extensive collection of data from many different sources. Therefore one of the suggestions was to integrate strategic (IS) planning and especially the generation of strategic options with the evaluation in order to reduce the data collecting efforts. Finally, the involvement of many internal and external stakeholders in EB investments introduced a negotiation element in the evaluation of EB investments with respect to the distribution of the "negative and positive" impacts.

4.2 Final remarks

The proposed checklist will be more explored and improved in practice. Especially attention will be paid to the relation with strategic IS planning, completeness and understandability of the checklist by managers. There will be reviewed more literature especially regarding the business redefinition focus and especially in the field of business networks and their value.

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