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Abstract

This paper presents CES framework for discussing ES from an organizational effectiveness perspective. The framework builds on Quinn and associates' competing value approach of organizational effectiveness. The framework can be used to appraise and evaluate ES as well as enhance communication between designers and users about ES impact on organizational effectiveness.

Introduction

Improved organizational effectiveness is often claimed as a desired end for implementing Enterprise System (ES) or more commonly referred to as Enterprise Resource Planning system (Willcocks and Lester, 1999). Studies have indicated improved organizational effectiveness, such as business process improvement, increased productivity, integration among business units, as well as real-time access of data and information. The same studies have also described cases where the implementation has failed and the result has been the opposite affect on organizational effectiveness (Davenport, 1998).

The topic of this paper is a framework (CES – Competing value approach ES) for appraisal and evaluation of ES as well as ES impact on organizational effectiveness.

The paper is organized in the following way. The next section describes and discusses one approach for implementing ES. The third section follows with a presentation of competing values approach (CVA) and how CVA will form the basis for CES. Section four presents the framework and how it can be used, and the final section presents some conclusions and recommendations for further research.

ES Implementation Approaches

Implementation of ES refers to the process necessary to adapt, install and effectively utilize the system in the business environment of a user organization (Kirchmer, 1998), which may be compared with traditional CBIS analysis and design. One important issue in information systems implementation is the relationship between designers, system, and users (in this case users refer to the user organization). Information systems literature recommends that users should be involved in the design process, e.g. project initiation, analysis, design, implementation, and maintenance. A problem encountered in ES implementation is that users cannot participate in the analysis, due to time constraints (Nandhakumar and Jones, 1997) as well as to the fact that ES affects so many organizational members (Davenport, 1998). A solution to this problem is to develop implementation methods and frameworks based on management, organizational, and information systems models and theories. Such methods may support the implementation by enhancing communication between designers and users (Carlsson, 2000). Before presenting the underlying theory and model, one ES implementation method will be briefly reviewed.

SAP AG's implementation method ASAP is used as an example of ES implementation methods. ASAP incorporates knowledge and consulting practice from many implementation projects and in part from information systems literature (Buck-Emden, 2000). ASAP is a computer-based project management and implementation method that comprises five phases: "Project Preparations", where project mission and scope are defined. "Business Blueprint" includes a complete and comprehensive analysis of requirements and business processes. "Realization", where the system is configured and tested. "Final preparation" includes transfer of data from the old systems and end user training. The "Go Live and Support" phase is when the actual installations take place (SAP, 1998). Each of the phases include a large number of tools and utilities to simplify the implementation, such as Concept Check Tool for handling data volume conflicts and Implementation Guide for supporting the configuration of the system (Buck-Emden, 2000).

ASAP basically follows the stages in Systems Development Life Cycle (SDLC) (Hoffer et al., 1999), with the exception that ASAP phase "Business Blueprint" comprises both requirements analysis as well as system specification and design, but in reverse order. The focus of ASAP is on cost, time, and return on investment (Miller, 1998). This focus has to some extent been confirmed in a case study of four ASAP guided implementations, where change management and end user training were two areas found not to be sufficiently covered by ASAP (Dolmetch et al., 1998).

The method can be described as technically oriented and the goal is to install the system in a user organization. This approach may in some cases be useful, e.g. when an organization have an acute computing problem. But the approach has also some limitation, since ASAP focuses to a large degree on implementing the system, it is therefore not complete in generating suggestions for how CBIS may support organizations and thereby improve organizational effectiveness. Thus, this paper builds on the idea that the focus should be on organizations and their business and how CBIS may support operations, not only a technical installation guide.

The approach taken in developing the framework was to review some descriptive and prescriptive management, organizational, and information systems literature. The assumptions was that the review should point to areas in which CBIS can logically aid organizations and it should be possible to develop an approach for guiding ES implementation. The theory and models builds on the competing values approach (CVA) and will be presented in next section.

The Competing Values Approach

Organizational effectiveness can be traced to early economic, accounting, as well as general management theories and is an important issue in IS research (Checkland and Howell, 1999). Traditionally it has been defined as meeting or the surpassing of organizational goals (Bedeian, 1987). This goal approach towards organizational effectiveness is and has, despite criticism, been the dominating approach for studying organizational effectiveness (Hall, 1980). Criticisms have included organizations having multiple goals (Cameron, 1981), unambiguous criteria for measuring effectiveness (Meyer, 1985), and that organizations are rethinking their performance measures (Eccles, 1991). Other organizational effectiveness approaches have emerged in order to deal with these problems and others, system resource approach (Cunningham, 1978), internal process approach (Ostroff and Schmitt, 1993), stakeholder approach (Tusi, 1990), and competing values approach (Quinn and Rohrbaugh, 1981; 1983). Despite these efforts in measuring organizational effectiveness it is still difficult and potentially controversial to do so (Cameron and Whetten, 1983), which can be illustrated by a list of 30 different criteria for organizational effectiveness, ranging from productivity and profits to growth (Cambell, 1977). With regard to this CVA is especially notable, since it combines diverse indicators of performance and has developed to an accepted methodology for assessing overall organizational effectiveness.

CVA is based on the finding that most measures of effectiveness reflect one of four organizational models: human relations model (HR), open systems model (OS),

internal process model (IP), and rational goal model (RG) (Quinn and Rohrbaugh, 1983), with respect to three sets of underling competing value dimensions (Buenger et al., 1996): The first value dimension is focus, which is concerned with issues that are internal or external to the organization. Internal focus emphasizes on well being and efficiency and external focus on the organization itself and in respect to the environment. Structure is the second value dimension, and is concerned with stability and flexibility in the dominant organizational structure. Stability refers to the need of top management control and flexibility refers to adaptation and change. The last value dimension concerns ends versus means.

The critical point to note is that while certain pairs of effectiveness criteria reflect competing organizational values, they are not dichotomies. To be effective may require that organizations are both flexible and stable as well as having an internal and external focus at the same time (Quinn and Cameron, 1988).

Based on the four organizational models (HR, OS, IP, and RG) two organizational roles where created for each model.

HR includes facilitating and mentoring. Facilitating includes teambuilding, building trust and moral in the organization, and conflict management. Mentoring includes engagement in the development of personal by listening and being supportive, communication internally, developing individual plans, giving feedback to individuals and groups, and developing management skills.

OS includes innovation and brokerageing. Innovation includes interaction with the external environment, identification of major trends, business intelligence, developing mental models, and facilitates changes, and R & D. Brokerageing includes communication with the environment, identification of problems, influencing the environment, maintaining external legitimacy through a network of external contacts, profitability analysis, and acquisition of valuable resources.

IP includes auditing and coordination. Auditing includes collection of data, mainly internal and quantitative information used to check organizational performance, enhance the understanding of activities, and ensure that standards, goals, and rules are meet. Coordination includes maintaining organizational structure and workflow of the organization, coordinating activities, as well as collecting and distributing information.

RG includes management and production. Management includes clarification of expectations, goals and purposes through planning and goal setting, defining problems, generating and evaluating alternatives, generating rules and polices, evaluation of performance, and decision support. Production includes

quality control, motivation of organizational members to enhance productivity, sales support, efficient production, and profit maximization.

A notion should be regarding CVA is that at least two important factors for studying organizational effectiveness are not taken into account, namely time frame (Quinn and Rohrbaugh 1983) and level of analysis (Quinn 1988). Time frame refers to the fact that criteria for measuring organizational effectiveness may vary on whether a relatively shorter or longer time frame is adopted and that organizational are in different stages in their life cycle, and that criteria various in different life cycle. Level of analysis refers to micro and macro levels will to a large extent affect the relative organizational effectiveness criteria, e.g. individuals, group or entire organizations.

The four organizational models and their organizational roles form the base of the framework and the next section will present CES and the use of the framework.

The CES Framework

The reason for developing CES has been observations of ES implementations where individual users have perceived improvements; such as integration among business units and functions, but these improvements have not had any overall impact on organizational effectiveness (Cooke and Peterson, 1998). So, the motivation for developing the framework has been to enhance the communication between designers and users. The framework should not be seen as a method for ES implementation, but primarily as a tool for discussing ES from an organizational effectiveness perspective.

CES Development

Point of departure in developing the framework has been CVA and the organizational roles and their effectives constructs. By applying ES capabilities on CVA four generic ES subtypes has been developed, which are named ES-HR, ES-OS, ES-IP, and ES-RG. The next step in developing the framework has been assessing ES capabilities to ES subtypes, some capabilities are relevant for more than on subtype. ES capabilities are drawn from literature (Keller and Teufel, 1998) and one ES system, namely SAP R/3. In the framework there is a distinction made between traditional capabilities and new capabilities. A specific ES is a combination of the four subtypes and has to a larger or smaller extent characteristics of the four subsystems. The relationship between ES subtypes, ES capabilities, and CVA is depicted in figure 1. The four ES subtypes and their supporting ES capabilities are:

ES-HR is the first subtype and helps an organization in the development of the human capital. ES-HR

capabilities and features of importance are similar to what may be found in Computer Supported Cooperative Work literature. E-mail, voice mail, and videoconferencing may be used in ES-HR to overcome distance and time. ES human resource module does support individual planning and training and ES do include both e-mail and calendar. However, the e-mail functionality might not be the best. ES does not support the facilitating role.

ES-OS is the second subtype and has an external focus and an emphasis on structural flexibility. This supports an organization in identifying problems and possibilities by supporting environmental scanning, issue tracking, and issue probing. Environmental scanning may be quantitatively or qualitatively oriented and may include industry and economic trends, legislative issues, competitor activities, new product and process development, and patents. ES do not support ES-OS in a sufficient way at all. This is ES weakest spot, they are to structured and have too much of an internal focus. However, some new ES capabilities support the ES-OS, such as management cockpit.

Figure 1. The CES framework

ES-HR	Flexible	Structure	**ES-OS**
Organizational roles: facilitating; mentoring	Means: cohesion; morale	Organizational roles: innovation; brokerageing	Means: innovation; adaptation
Traditional capabilities: Human resource management; e-mail; calendar	Ends: human resource development	Traditional capabilities: ?	Ends: organizational growth
			New capabilities: Management cockpit
Internal focus			External focus
Organizational roles: auditing; coordination	Means: information management; communication	Organizational roles: management; production	Means: planning; goal setting
Traditional capabilities: Controlling; Investment controlling; Materials management; Production planning and control; Project system; Plant maintenance; Master data; Workflow; Industry solutions	Ends: control New capabilities: Data warehouse; APO	Traditional capabilities: Financial accounting; Sales and distribution; Quality management; Materials management (procurement)	Ends: productivity New capabilities: Management cockpit; SCM; APO; CRM; e-commerce (B2C, B2B); Data warehouse
ES-IP	Stable	Structure	**ES-RG**

ES-IP is the third subtype and has an internal, control, and stable structure emphasis. It supports the internal process model and the associated organizational roles. From an organizational performance perspective the objectives is to provide user-friendly support for auditing and control. ES are replacing traditional legacy systems, such as accounting systems and production

systems. ES capabilities for supporting ES-IP include: controlling, investment controlling, material management (stock inventory), plant maintenance, production planning and control, project system, workflow, master data (refers to the work of creating master data records for e.g. customer, vendor, and material etc), and industry solutions (refers to predefined business processes benchmarked for a specific industries, such as banking, public sector, oil and gas). Newer ES capabilities are Data warehouse and Advanced Planning Optimizer (APO) or multiple production site planning. This subtype is the core of ES

ES-RG is the last subtype and has an external focus and stable structure is a prerequisite. This subtype supports mangers in organizations, by giving means for primary activities, such as production planning sales, and logistics. Capabilities and features found in traditional Decision Support Systems, such as goal setting, forecasting, simulations, and sensitivity analyses, are available in some ES, but in a rudimentary way. Other ES capabilities include: financial accounting, sales and distribution, quality management, materials management (procurement). Newer capabilities include: customer relationship management (CRM), supply chain management (SCM), e-commerce solutions (B2C and B2B), and management cockpit.

The framework is a first plot of ES capabilities and their relationship to different organizational effectiveness constructs. How the framework could be used will be presented in the next section.

CES Use

Implementation of ES is a large and complicated process, which can take years to complete and drain organizations of their resources (Davenport, 2000). Due to the complexity and time frame in ES implementations vendors have developed methods to ensure a speedier and more cost efficient implementation. However these methods have some shortcomings, e.g. change management. These shortcomings exist mainly because of the focus in those methods, which is cost, time and return on investment.

With this background CES may prove to be a helpful tool for enhancing communication between designer and users. Initially have two main areas been found to be useful for CES. The first area is appraisal and evaluation and the second area is ES impact on organizational effectiveness.

Appraisal can be done during the selection phase and during the design and implementation process. Evaluation takes part when the system is in use. Organizations with a primarily focus on ES-HR and ES-OS should look for alternative systems, since most ES capabilities do not support this type of organizational effectiveness constructs. However organizations with a focus in the opposite direction, i.e. ES-IP and ES-RG,

should probably chose ES. Two of three value dimension seams also to be good indicators if an organization should chose ES or not. Internal and external focus seams just to make a difference when choosing ES capabilities. Another way CES can support the appraisal of ES is by mapping the organizations effectiveness construct with the specific capabilities in different ES. The framework may support evaluation of ES by presenting effectiveness criteria for each ES subtype, e.g. if an organization evaluates an ES from an ES-RG perspective, they should be aware that most benefits from an ES lies in the ES-IP box.

ES impact on organizational effectiveness is the second area, where CES may by useful. Each ES capability has its own benefits from an effectiveness perspective, e.g. that controlling has an internal and control emphasizes. So, organizations should not expect any improved organizational effectiveness in areas that ES don't support.

In conclusion CES can work like this: If there is a good fit between the current situation and the desired situation means that there is no need for a new ES. The result can still be used for discussing the design of an existing ES, but the primary purpose of the ES would be to improve the efficiency - the ES will primarily reinforce and improve the current state. If there however is a misfit between the current situation and the desired situation or there is a misfit between current support and desired support, then there is an opportunity to develop an ES. In this case the ES will be used as a means (tool) for focusing organizational attention and learning as well as a means for organizational change.

Final Remarks

The framework has used supplementary ways, namely management, organizational, and information systems models and theories to identify organizational effectiveness constructs and ES capabilities. However, in a real case situation this has to be complemented with formal and non-formal methods and techniques (Camron and Quinn, 1998). With the use of other formal and non-formal techniques and methods it is possible to assess how different organizational roles perceive effectiveness constructs as well as what they perceive as critical for that organization (Watson et al., 1997). One such method or technique is the "competing values organizational effectiveness instrument" (Quinn, 1988) - this instrument measures perceptions of organizational performance. Together these instruments and supplementary ways will be used in developing a recommendation for how the competing values should be changed and how an ES should support different organizational roles.

During the design of the framework one ES exemplar have been used, as a test bed. The usefulness of an exemplar is the availability of descriptions of how

ES may support organizations. A notion should be made here regarding exemplars: How a business should be organized and what use ES has for that firm is based on how that vendor perceives this.

Other remarks are that research has suggested that there are changes in the criteria of effectiveness in an organizations life cycle (Quinn and Rohrbaugh, 1983) and changes can be found with regard to different organizational levels (Quinn, 1988). The implications of these findings are that the importance and criticality of effectiveness criteria and organization roles will vary over time as well as between organizational levels.

Conclusions and Further Research

The CES framework has been presented as a tool for appraisal and evaluation of ES and as a promoter for discussions of ES impact on organizational effectiveness between designers and users. The theoretical foundation of the framework is mainly competing values approach by Quinn and associates. The use of framework is thought to support ES implementation by enhancing communication between designers and users, especially during appraisal, evaluation and during analysis.

The development of the framework builds on knowledge from information systems writing, for example, information systems failure, top-management support, relationship between designers, system and user, and continuous improvement. The framework has thereby positioned itself against the technical orientation in some implementation methods. However this should not be viewed of a critic of those methods. The goal has merely been to point out some shortcomings.

The proposed framework has several characteristics making it useful. It is related to a critical construct: organizational effectiveness. The model stresses support of organizational roles and not just as a CBIS that supports organizations by integrating all information flows. It has a paradox and complexity perspective, which has been pointed out as necessary in information systems research and practice (Robey & Boudreau, 1999). The overall contingency approach makes it possible to evaluate an ES in context. Hence, the model stresses that not all ES are equally effective in a specific context.

Research in the future will include empirical studies needed to validate the usefulness of the framework. Future research will also include the development of tools for mapping organizations effectiveness construct with capabilities. Future research might lead to a development of the framework to an overall method for ES appraisal, implementation, and evaluation.

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