Understanding "IS Effectiveness and Efficiency": Based on Management Levels in the Organization

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Abstract

Measuring the business value of Information Systems in an organization is complex, because of differences in roles, goals, and responsibilities in each organization's level. There are different levels of management within an organization supported by Information Systems, including Operational Management, Tactical Management, and Strategic Management. The purpose of this study is to analyse the research on measuring the effectiveness and efficiency of Information Systems at each level so that it can be known the business value of Information Systems. The method used is to collect literature relating to the effectiveness and efficiency of Information Systems. We group existing domains based on the organizational level. From the results of the literature review, three measurement groups can be considered. This literature review provides new research opportunities to take measurements based on existing theories and prove measurements that are appropriate to the organization.

1. Introduction

Establishing an appropriate information system (IS) and evaluating the success of IS is very important these days, given the need for companies in various fields to be superior and efficient. Developing methods and techniques for assessing the value of Information Technology (and IS) is a difficult and challenging task (Sethi et al. 1993).

There has been a lot of research done by making models and frameworks for conducting evaluations to determine the value of IS businesses. Kun proposes a framework for the realization of business value during the deployment of enterprise information systems (EIS) (Kuna 2014). This framework uses a holistic approach, in which the application of EIS investment to the organization is expected to shorten processes and minimize resources so as to drive customer performance and increase revenue.

Measurement or assessment of the business value of a company must consider the strategy, goals and objectives of the organization itself. Assessments that are not related to the organization's strategy, goals and objectives need not be used (Hamilton and Chervany 1981). For example, someone who is going to measure body weight can use an analog or digital scale, and it is not recommended to use a vegetable scale because the measurement is not appropriate. There are different management levels in an organization that are distinguished by the objectives of each level. This study wants to focus on approaches to effectiveness and efficiency based on organizational level to find out IS Business Value.

2. Literature Review

The study of the theory discusses the basic theories and concepts related to research in order to obtain a theoretical construction foundation as a guide and benchmark of research. The theoretical studies of this study include Organization's Level and IS Measurement.

2.1 Organization's Level

Information Systems are not just hardware and software used by users, but more than that, Information Systems are a unity between technology, organization, and people who cannot be separated from one another. Information systems can provide value for an organization by providing solutions to existing challenges.

Information systems are an inseparable part in an organization. The information system that is formed adjusts to the existing organizational structure. Of course this will be different from one organization to another. In addition, Information Systems are also distinguished by the needs and performance activities that exist at a level of organizational structure. Generally each organization has 3 levels as shown in Figure 1.

Strategic management, also called senior management, has the task of determining the long-term strategy that exists in the company. It also ensures that the company's finances remain safe. Tactical management, also called middle management, has the task of carrying out decisions that have been made by strategic management. Operational management is responsible for controlling the operations of the company (Laudon and Laudon 2016).

2.2 IS Measurements

The success of IS can be measured from a different perspective. In individuals, the success of IS can be measured by the level of satisfaction and utility. In the process or function, time and resource efficiency. Whereas in organizations, the benefits of IS can be measured based on organizational performance, for example, market share, return on equity, and profitability.

Measuring the success of IS at the organizational level can be measured as follows (1) Alignment of information technology with the goals of the organization, (2) Improvement in general organizational performance (can also be obtained from the performance of each individual), (3) Efficiency of costs incurred after the existence of a system (operational costs) and the time for completion of work, (4) the overall revenue of the company after the existence of new products and services, (5) return on equity and shares, and investment (Garrity and Sanders, 1988).

This study focus on IS effectiveness and efficiency measurement based on organization's level. Effectiveness the degree to which something is successful in producing a desired result. Efficiency means the state or quality of achieving maximum productivity with minimum wasted effort or expense.

Figure 1. Organization’s level of management.

3. Research Method

This chapter describes the research methodology used in this systematic literature review.

3.1 Literature Search

A systematic literature review was carried out to identify research on the effectiveness and efficiency of existing SI. The review must be done in a manner that is in accordance with the rules of research, including how to obtain literature, analysis of the literature, and the selection of literature in accordance with the topic under study. This process is an academic study that is important for the development of theory and the advancement of knowledge (Webster and Watson 2002).

3.2 Selection Criteria and Method

This study adopted the method used by Mathiassen et al. (2004) in his study. The method used is to search for studies relating to the Effectiveness and Efficiency of Information Systems. From the collection of studies, the sorting of research that is most correlated with SI Effectiveness and Effectiveness is carried out. After that from searching again based on the bibliography. In the final stage, the entire study was combined so that the results obtained were maximal.

The steps are as follows, step 1: enter the keyword "Information Systems Effectiveness" OR "Information Systems Efficiency" OR "Information Systems Measurements" in five selected databases, Science Direct, IEEE, Emerald, ACM, and Google Scholar. In step 2: we choose a title that is relevant to the topic. Step 3: we read the abstract and the entire article at a glance. In step 4: we look for research related to the effectiveness and efficiency of the information system from the bibliography, then proceed to step 5: choose a title that is relevant to the research topic. Step 6: we combine the results of stage 3 and stage 5. The results of the search can be seen in detail in Table 1.

3.3 Data Extraction and Presentation

The results of the literature review discuss into categories: (1) Operational Management Levels (2) Tactical Management Levels (3) Strategic Management Levels. Then in each category, it is searched based on the efficiency and efficiency of the information system. The results obtained consist of determinants of benefits and efficiency at each level of the organization.

4. Result and Discussion

4.1 Operational Management Effectiveness & Efficiency

Operational effectiveness is the ability to build processes that are in line with the core of the organization to meet customer needs (Santa et al. 2019; Evans and Lindsay 2011; Porter 1996). Factors that support organizations to achieve operational effectiveness include costs, quality, reliability, flexibility, and speed (Hill 2005). Organizations need to improve cost performance by identifying effectiveness and waste in business processes such as procurement, product, or service design, and staff performance (Russell and Taylor 2008). Quality is important in the organization's operations in terms of providing consistent products and services that satisfy customers (Corbett 1992). Reliability shows that the organizational process does the job expected consistently over time. That is, customers are satisfied with organizations that provide services in accordance with agreements over a period of time (Corbett 1992). Flexibility in operations is very important in service and manufacturing industries, because it can adapt to the changing market environment which is very fast changing, so that the company remains in a competitive position (Slack et al. 2006). Organizational speed in adapting to providing products or developing new services is very important because the environment continues to change (Tidd and Bessant 2018).

Operational efficiency factors has taken from the main items used by the market to assess the efficiency of the production plant especially in Chemical Industry (Barbosa and Gomes 2015). These factors are overall equipment effectiveness, overall effectiveness capacity, and specific production costs.

4.2 Tactical Management Effectiveness & Efficiency

One function of tactical management is to run programs that have been planned by strategic management. Tactical management can make short-term decisions. Therefore, measuring effectiveness at this level is based on decision making. Measurement of the effectiveness or success of decision making can be measured by the company's superiority compared to competitors in terms of the ability to adapt quickly to trends, the ability to understand customer needs, and make real-time decisions (Barbosa and Gomes 2015), of course this is in line with the objectives which has been established at the strategic level (Eisenhardt and Zbaracki 1992; Lessard and Zaheer 1996). As additional information, this has conducted research on the relationship between information processing capabilities, the effectiveness of decision making, and competitive advantage (Barbosa and Gomes 2015). The result is that information processing capabilities have a positive relationship with competitive advantage mediated by the effectiveness of decision making. While decision making efficiency is influenced by several groups, namely technology, processes, and external factors (Kim et al. 2007). Factors of technology include communication capacity and early detection & response. Factors of the process include information sharing, reliable information channel, and access to external agencies. Factors from external factors include excessive regulation on security, excessive regulation on privacy.

4.3 Strategic Management Effectiveness & Efficiency

Measurement of the effectiveness of strategic information system planning is based on the success of achieving goals (Mirchandani and Lederer 2014; Raghunathan and Raghunathan 1994; Segars and Grover 1999). Some of the goals that can be achieved at this level include, success in aligning IT with business needs so that success in IT as a superior and competitive product, increasing consistency and strategic management commitment to IT, estimating and allocating information technology (IT) resources, architectural development IT, ease of identifying strategic IT applications, and the latest and more sophisticated IT application innovations. These goals are important to minimize the costs used in planning, implementing, and maintaining IT (Basu et al. 2002; Chi et al. 2005; Lederer and Sethi

1996). Measurement of the efficiency of strategic information systems planning is based on IS Resource and Operational Efficiency (Cassidy 2016). Overall measurement factors for IS effectiveness and efficiency can be seen in Figure 2.

Table 1. Search result[a].

	Results (articles)				
	Sciencedirect	**IEEE**	**Emerald**	**ACM**	**Google scholar**
"Information Systems Effectiveness" OR "Information Systems Efficiency" OR "Information Systems Measurement"	175	46	21	7	4440
Choose the most correlated research based on the Research Title and be sorted from the top Q ranking	41	5	11	4	124
Read the contents of the research and choose the most related to the Effectiveness and Efficiency of Information Systems based on Organizational Level	4	1	1	0	2
Look for other research taken from Bibliography	10	4	4	0	6
Re-select the research that is most related to Information System Effectiveness and Efficiency	6	1	2	0	2
Combine the overall results of existing research searches so that search results are maximized	10	2	3	0	4
[a]The number of final stages of research after going through the entire data collection process: 19 papers					

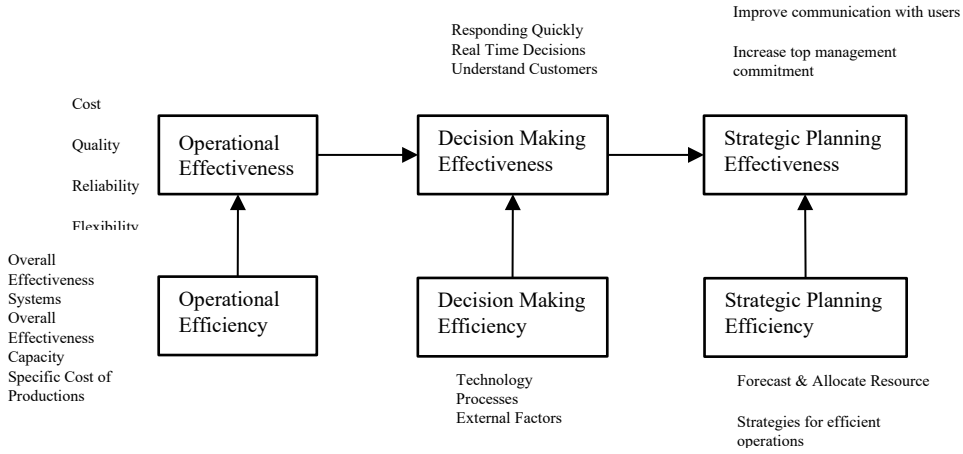

Figure 2. IS effectiveness and efficiency measurement.

5. Conclusions

This study examines the measurement of the effectiveness and efficiency of SI based on the level of the organization. Each level has a different purpose. Therefore, measurement of effectiveness and efficiency must be in accordance with the object to be measured. From the review literature examined, researchers found the appropriate variables at each level. Operational management is measured based on operational effectiveness and efficiency. Tactical management is measured based on decision making effectiveness and efficiency. Strategic management is measured

based on strategic planning effectiveness and efficiency. From the existing factors, it is expected to know the IS Business Value. Future research can prove or refine more comprehensive factors and can adjust various types of organizations.

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