



A METHOD FOR IDENTIFICATION OF BENEFITS GAINED FROM DEVELOPING INFORMATION SYSTEMS

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Abstract. A specific task of identifying benefits of employed information systems for the purposes of estimating their broad efficiency was considered in the article. The issues that should be addressed while estimating information systems efficiency are indicated. An approach to identifying benefits of an information system that is a multistep iteration process is developed. While following all steps of the method that has been offered, financial constraints should be allowed for and a range of requirements of system need to be reviewed, as appropriate. It has been demonstrated that appropriate mathematical models are demanded to be used in the different phases of the life cycle of information systems. A specific model is opted subject to constraints on a level of uncertainty of initial data. During the early phases of information system life cycle it is recommended to employ fuzzy and cognitive models and while operating it is better to use cybernetic and neural network models.

Introduction

Under estimating information system efficiency, costs of its exploiting need to be counted as well as possible benefits should be estimated (or forecast). It is not challenging to count the costs as methods of total ownership value and function cost analysis could be involved. But in estimating possible benefits (profit or cost saving) a researcher faces a range of challenges that are transitive and implicit influence of information system on final results of company's activity, difficulty to separate effect gained by available information system and effect generated from other production factors, intangibility of information as a major product of any information system as well.

Most of the methods to estimate information system efficiency see benefits of them as generating a priory (Terry White, 2004, p.113). For example, there is a rule to regard information systems as providing cost cuts, production increase and inventory management improvement etc. (Hočevar B., Jaklič J., 2010, p. 93). More often such options of information systems are declared by the developers of hardware and software in terms of explicit and implicit commercial and that misleads potential consumers regularly. Taking into account new technologies rocketing for the last decades, we are not surprised at advance in telecommunications and computers and we tend to believe in them even if the effect as promised has not been had.

It is frequently observed that while submitting evidence of information systems benefits, they refer to research outcomes provided by Association for Operations Management (APICS) that constitute statistical analysis made for a group of American firms that in turn generally employ information systems of ERP class. Unfortunately original data collected from that firms, conditions of conducting research as well as peculiarities of integrating systems throughout the company are not provided. As a consequence to estimate whether information is reliable and credible is not possible. Therefore the issue how to estimate benefits of information systems need to be addressed making a use of modern mathematic methods and cyber-economic models.

Results

Companies integrate new or improve current information systems for some reasons: because partners or rivals have them, promises given via commercial are attractive, there is a wish to use modern technology, it is a way to make it a nice company for investors and shareholders etc. Any case whatever the reason of integrating or improving the information system it is expected to bring benefits in terms of resource saving, production and sales increase etc. by company's managers.

Regardless of rare occasions information systems do not influence directly on amount of raw materials used in production but are able to account them and calculate norms of their use. How can a subsystem for accounting of raw materials used in production influence on their actual use? Only when the reports are analyzed by experts and recommendations to reduce consumption of raw materials are given. If the same subsystem is combined with the module for above stated norms being recalculated and corrected allowing for quality of raw materials then people participation will be minimized. In case of connecting this subsystem with those for making plans and control of raw materials consumption, tasks of minimizing their use in production processes, inventory cutting and increase in capital turnover could be undertaken.

As it is posited at (Terry White, 2004, p.125; Hočevar B., Jaklič J., 2010, p. 88) information system must ensure achievement of business goals and solve concrete problems of the company first of all. The issue of the goal that should be achieved through integration or modernization of information system is sufficiently difficult to address and usually business and IT specialists see it in a different way. For instance such purposes as to increase a throughput of computer network or enlarge data warehouse along with access speed may be considered correct from IT experts' point of view. But business does not always understand them. Of course it would be effective to improve hardware specifics of the information system but firstly it requires extra expenses and secondly benefit of business is unclear. As for business the following goals are more obvious: implementation of a company strategy, reduction in production costs, increase in product sales, reduction in administrative expenses and increase in a level of efficiency available from use of production factors, such as raw materials, labor etc., and finance.

On the assumption of all stated above, we offer the following method of identifying benefits of information system which include a series of steps and each allows for specific questions to be answered. Besides, each next step is based on the results of the previous steps.

1. What kind of problems are within the company? Despite simplicity of delivering the first step can be the most complicated for the following reasons. Firstly it is hard to find the specific field not connected with others. For example the problem related to writing plans of production output can be caused by coming logic: imperfect current system of planning, bad system of contacts with demanders as well as suppliers and outdated production capacity. Secondly employees of the company are used to present information system so to find its disadvantages is rather difficult for them.

2. What are information aspects of the problem: information is too restricted to take decisions (quantitative aspect); information delivering is untimely and not prompt (time issue); information is hardly interpretative (quality aspect); calculations are complicated and require a large number of working hours (cost issue); a great data base including previous periods of time are needed to obtain results, for instance forecasts (technological aspect); imperfect methods of calculations that require extra mathematical models (mathematic aspect) and others. This step lacks detailed analysis of business processes and documents flow throughout the company and revealed roots of problem concerning information provision.

3. What will solution of each problem stated at the item 2 bring for business? Here one cannot avoid use of mathematical models which should meet the next demands: to be clear for specialists in different spheres (management, economics, IT); to use actual data and intangible assets owned by the company; to show final results in clear and simple form if possible of chart, table and a range of values. Option of the model type depends on the phase of information system life cycle that is on a level of uncertainty, quantity and relevance of the data. Start phases of the information system life cycle are described by not enough or absent data of its performance. So at these stages it is better to use fuzzy cognitive maps (Kosko B., 1986, p. 72) and fuzzy productive models (Piegat A., 2001, p. 524) that enable prior estimation in case of lack of information and direct connection between objects of the same sphere. At the phase of the system exploitation some data of its performance have been already collected so it is possible to use cybernetic (Devaraj Sarv, Kohli Rajiv, 2002, p. 147) and neural network models (Bizyanov Y.Y., Golda O.A., 2010, p. 8). When employing econometric and neural network models it is appropriate to take dimensionless coefficients that estimate changes of management, production and information system of the company as independent variables. Reverse, business outcomes such as production output, sales and market share increase should be determined as dependent variables (Bizyanov Y.Y., Golda O.A., 2010, p. 9).

4. What hardware and software including mathematical programs should be bought or developed? What items of the list are available and what is their condition? Such data could be mined through the audit of a company information system.

5. Does the company employ workers of the appropriate qualification to implement bought or company's own information system? Does company need to take services from other companies?

6. How long it is until the information system is developed and implemented and how much is it? The answer to the question is given by IT department of the company or outside firm as a potential supplier of the service.

7. What will be the cost to maintain the system hereinafter? The answer could be found due to company's own experience or through calculating value of license to own the information system.

The sequence described above is an iterate process (Fig.1).

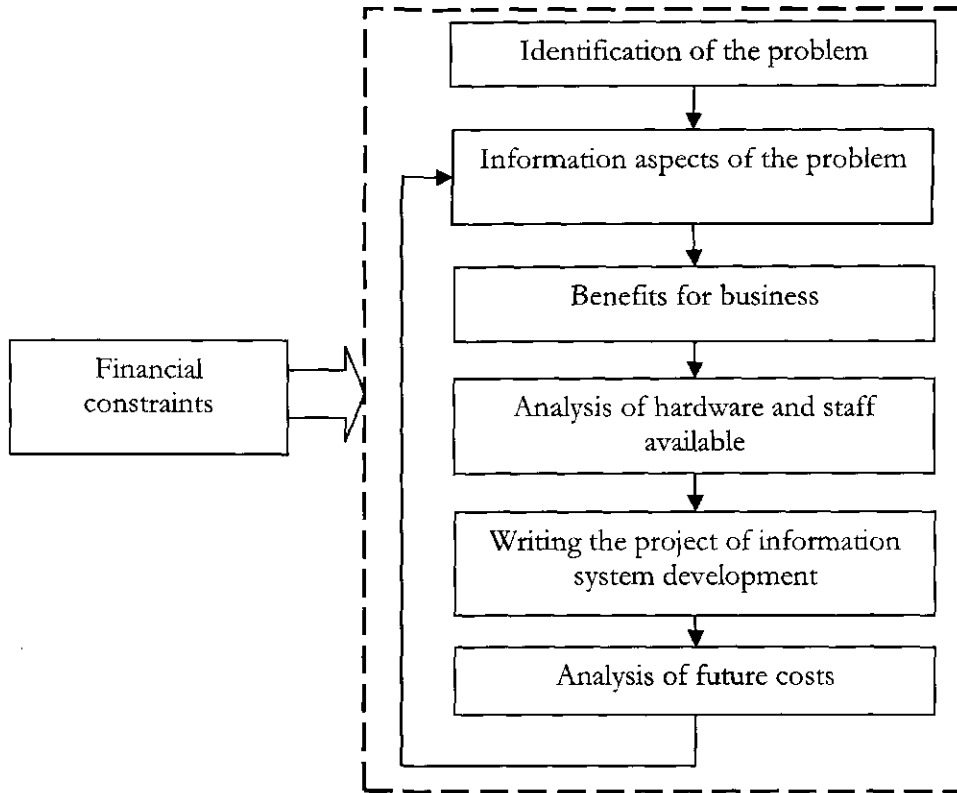


Fig.1. The process of identifying benefits of information system use

Taking all steps of above described method one should pay respect to financial constraints imposed on the project of company's own information system by the governors of the company. If costs of development, implementation and support of the information system exceed the pointed limits one should return to step 2 so that problems selected for solving are reviewed.

The process of benefits identifying should not be broken. It will make it possible not only to estimate but also manage the efficiency of the information system delivering its optimization for business goals being achieved.

Discussion

1. The method of identifying benefits of developing information systems that is step by step iteration process with the use of economic and mathematical models and current constraints.

2. Under identifying benefits of information systems it should be focused on achievement of business goals and clear problems solution first of all.

3. It has been shown that during the different phases of the information system life cycle, appropriate mathematical models need to be employed depending on the level of uncertainty of initial data. At start phases of the information system life cycle with lack of information about its performance fuzzy and cognitive models should be used. They provide prior estimation to be made. At the phase of exploitation more accurate econometric and neural network models are appropriate. As independent variables of econometric models dimensionless coefficients are suitable to estimate changes of management, production and information

systems. As dependent variables business outcomes such as production output, sales and company market share increase need to be included in these models. During further research work there are plans to create methodology for running information systems of companies in the most effective way.

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