



Reserves Analysis versus Requirements Analysis

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Reserves analysis versus Requirements analysis

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Abstract. The popular opinion says, that ICT's effectiveness in business organisation is up to a degree, in which ICT provides for users' needs. That is why, the popular way of doing a prior analysis in ICT projects is just asking future users (especially decision makers) about their information needs. I do not think, that it is good starting point for building effective ICT applications – as there is no dead certainty, that a delivery of additional information (which is planned as a result of a given ICT investment) means better work of this organisation and in a consequence its higher effectiveness. In other words - there is no dead certainty that in the given organisation exist reserves, which can be exploited by better informed decision makers.

The **Multi-aspect Analysis of Reserves in Administration (MARIA)** is a proposal of assessing main factors determining effectiveness in a business organisation to show how important among them is information. In other words - the aim of **MARIA** is to assess most probably response of the organisation (in the sense of its effectiveness' growth) on possible ICT investments.

Taking into consideration Types of Papers expected for the BIR conference, the proposed paper can be treated as a contribution to *Exploratory papers* introducing new ideas, identifying the gaps that need to be addressed and introducing an approach as a means to bridge them.

Keywords: administration, effectiveness, reserves in management area, Information & Communication Technology (ICT).

1 Introduction

Despite the fact that 70 years have passed since the first applications of computers in the field of management, those applications often don't meet expectations of investors. They are many times: late, over budget, with less than the required functionalities or sometimes even cancelled prior to completion or delivered and never used.

Numerous research studies on ICT project failure have been realized, showing the following main reasons [7]:

1. Unrealistic expectations of investors
2. Incomplete requirements don't meet acceptance criteria
3. Users are not involved enough in requirements definition
4. Requirements are constantly and chaotic changing.
5. Insufficient resources for a project
6. Lack of management engagement

Despite the fact that numerous failures caused by various reasons are common in practice of investing in ICT (limiting the effectiveness of adequate applications), I consequently think that a modernisation of information system should not be treated as a target in itself, but as a way of earning extra money from business organization (BO). So, there is a need of effective method of ICT investment evaluation, which can be used ex ante. This opinion seem to be credible taking into consideration a still significant number of failures, which can be still observed in the area of ICT investments.

At present, however, the conditions for the assessment of systems have changed compared to previous periods. In view of the widespread use of ICT (information society, e-commerce, e-government etc.) and decreasing costs of access to this technologies - longer asking "whether to implement ICT?" makes no sense. However, the questions "How to do it?", "What scale of investment will be appropriate?" and "What impact can the considered ICT investment have on the effectiveness of the organization?"

Since many decades many researchers and practitioners try to evaluate ICTs' effectiveness proposing many ways in that matter. Although there are numerous and various proposed ways of ICT evaluation, I have not met among them anyone basing on analysis of internal, administrative reserves existing in a given organisation. In my opinion those internal reserves have a key importance. This opinion is conformable to a very widely known judgement¹, that a main source of effectiveness' growth, being a result of ICT investment, is an elimination (or a limitation) of organisational barriers, which exist in a given BO. Therefore I have proposed and elaborated an adequate method in the paper. The essence of the Multi-aspect Analysis of Reserves in Administration (MARIA) is defining how favourable (or not favourable) are the conditions for effective implementations of ICT in a specific business organisation, basing on its reserves' analysis. Another interpretation of the proposed approach is checking an organisation's sensibility of ICT implementation in terms of its effectiveness. The method treats ICT investments as any other investment and therefore it requires an adequate effectiveness of it.

¹ The problem was mentioned by Paul Strassman who said: "You get better value out of the high costs of investing in computers, when you first try to get better value out of your existing managers by trimming excess numbers of them. Since new computer systems often need more managers, if you fail to do this, you may end up with both: unneeded computers and unnecessary managers. Computers are terrific at helping us do many tasks that need not doing at all. Do not fast and well, what need not to be done at all."

This opinion was confirmed in Peter Drucker's account of conversation with an information manager at a large financial institution that invested \$1,5 billion in IT. Despite of the massive spending, no one in his department had yet thought seriously about what information was needed and what was not...

2 Reserves in Business Organization

The following schema (fig. 1) illustrates the most important determinants of BO's effectiveness and basic relations between them.

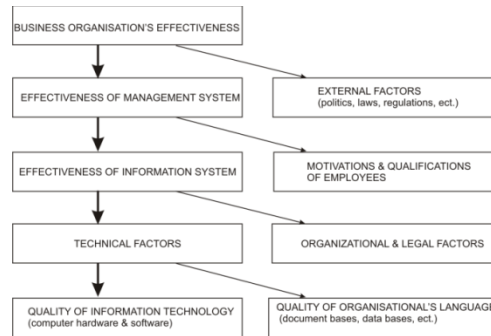


Fig. 1. Main factors determining effectiveness of BO (thick, vertical arrows mark a specific “critical path” of ICT effectiveness).

The above figure shows, that on the highest level of consideration, BOs' effectiveness is determined mainly by two groups of factors:

- effectiveness of management system (it means - internal factors controlled within a specific BO), and
- external factors (it means - politics, laws, regulations, economic situation and other outside circumstances).

External factors, as being out of control from a specific BO point of view, are beyond my interest in a further discussion. I will concentrate on an effectiveness of a management system.

The next level of elements in figure 1 proves that the effectiveness of management system within a specific BO is determined by:

- information systems' effectiveness and
- employees' motivations and qualifications (human aspect).

The level of motivation (reward power) determines the effectiveness of a given BO, because no effects can be accomplished - unless employees are encouraged to work on them. In other words - reward power determines effectiveness of BO in the sense, that there are no effects if there is no system-inclining tasks' performers to obtain them.

By the way, one can meet an interesting opinion that ICT applications' value depends on a quality of three elements: hardware, software and “human-ware”. The “human-ware” means users' readiness to transfer advantages of ICT into real, valuable effects for investing organizations. Such a readiness can have many degrees. Up to the degree of such a readiness – an adequate degree of an ICT application's effectiveness can be achieved. In some extreme situations ICT applications can have even

negative effects on BO. It can happen, when the organization had spent money and put other efforts for applications, which were rejected by potential users. It is necessary to stress here, that no benefits can be achieved just by an ICT's application itself. Always is needed a positive approach of its potential users, who can make the applications workable and effective.

The second mentioned factor - qualifications is well known. Every businessman understand clearly that skills of employees (as well as lack of skills) determine the effectiveness of a given BO. As qualifications' aspect however are not the main field of my interest in the paper, I will not discuss them further and concentrate on the effectiveness of information system.

According to the fig. 1, the determinants of information system's effectiveness (in a given BO) are as follows:

- technical issues, as well as
- organizational and legal issues.

Organisational and legal issues seem to be very important. The capacity of information channels may be significantly reduced by an excessive centralisation in organisation's management, absence of self-contained tasks' system and poor horizontal relations. The more levels in a hierarchy of management system - the bigger probability of deforming, delaying or reducing amount of information (including even some intentional actions) in its channels. Too long or too complicated information channels are overloaded and therefore not effective.

The very important barrier of information system's effectiveness is lack of access to important business data arising from existing legal regulations. For instance – terms of delivery offered by competitors in public procurement processes. Although those terms are very wanted data – they are not attainable because of adequate legal rules.

As organisational and legal issues are not in my direct field of interest in the paper, I will concentrate on determinants, which fall into technical factors:

- quality of information technology and
- quality of an organizational „language“.

Quality of an organisational „language“ is connected with such elements in BOs as: normative bases, documentation bases, databases, access to public registers etc. All kinds of possible problems with quality or accessibility to those sources of data may dramatically reduce the effectiveness of information system in a given BO.

Defining the quality of information technology two elements must be taken into consideration: quality of computer hardware and quality of computer software. Too poor or improper technical equipment of information system significantly reduces its capacity.

3 Conditions of effective ICT investment

Considering all those aspects we can define a special set of conditions, on which investing in ICT can be really useful and effective for a given BO:

1. It must be possible to increase effectiveness of a given BO by improvements in its management system;
2. A progress in effectiveness of management system can be achieved first of all by improvements in a BO's information system;
3. An effectiveness of the information system depends first of all on technical factors;
4. The most important technical factor limiting capacity of the information system is poor or improper quality of the information technology used in a given BO;

As conditions mentioned above are in many BOs not fulfilled, in many of them investments in ICT are not effective or they are not effective enough. So, one may say, that vertical arrows in fig.1 show "a critical path" of the effectiveness in ICT investments.

Another way of presenting the ideas mentioned above is shown in fig.2.

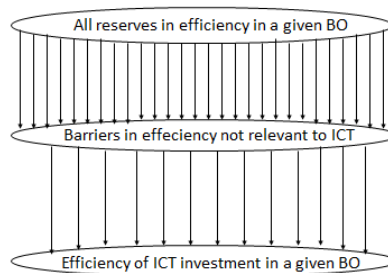


Fig. 2. A process of defining an effectiveness of ICT investment in a given BO.

One can see in it all reserves in BO's effectiveness (represented by arrows), which are partly blocked by factors not relevant to ICT. In the end it can appear, that ICT, in a given many case, is not as much important as one can expect.

The way of thinking presented above leads to two general conclusions:

1. Effectiveness of ICT investments in OBs is not automatic, it cannot be guaranteed in every situation. It depends on a specific constitution of various conditions in a given BO. This is why it is necessary to use an universal, objective and interdisciplinary

nary analysis of those conditions, which can be specific to every specific BO. Such an analysis should enable:

- to have a clear understanding of the main determinants of organisation's effectiveness and ICT's role among them;
- to make a reliable evaluation of potential ICT investments' effectiveness,
- to make the reliable evaluation if a given application effectiveness,
- to make the adequate evaluation of a given project's variants profitability,
- to create the reasonable strategy of an information system modernisation in BO, and in sum
- to treat a modernisation of information systems within an organisation as a business not as a target in itself and therefore to take precautions against needless investments.

Without such an approach, one can easily to magnify the role of ICT in an organisation's improvement and in a consequence to magnify effectiveness of possible projects and initiatives within in ICT area.

2. There seems necessary to reorient a starting point for new information systems' development from considering information needs expressed by potential users - to analysis of reserves, which exist in a given BO. I think so, because there is no equivalence between information needs declared by users and reserves in a given BO's effectiveness, which can be release due to delivery of additional information. In other words – it is absolutely necessary to define: Is there an effective scope for the management, bringing a chance to effectively use additional information obtained through investment in ICT.

4 Practical aspects of the “MARIA” implementation

In modern conditions, it is required to examine the effectiveness of the ICT investment under consideration of the following key expectations [4]: reducing cost, improving quality, decreasing time taken, decreasing risks and other.

Therefore, among the common requirements sources [11], such as:

- interviews with users and other stakeholders
- observations of users performing tasks
- enhancement requests for the existing system
- marketing material describing newest ICT's achievements
- analysis of ICT used by a market leaders (competitors)

is difficult to find sources fulfilling completely investors' expectations mentioned above.

I think that the MARIA workshop is a method for analyzing an ICT (Information & Communication Technology) investments' effectiveness. In place of interviewing (and other methods listed above), a workshop offers a possibility, in which a group of qualified users meets with IS personnel. The proposal is developed in an attempt to reduce problems associated with time consuming interviews: preparing interviews, conducting them, documenting the results, and combining the results into homogeneous set of conclusions.

The workshop was designed to shorten the analysis, to eliminate of possible errors and, consequently to reduce its costs. An important side-effects of the workshop are: increasing the users' understanding of the systems development process and promoting a participatory style of systems development. Those phenomena play a big, positive roles in a process of systems application in practice.

Generally the workshop is first step is to identify what should be done. Stakeholders come to the workshop with their identified problems. Once we've determined what should be done, we begin the process of building it. The requirement lifecycle continues to get as independent, small, and testable as possible.

The practical usage of MARIA requires the following steps:

First of all, a special invention group should be established in an organisation. The name comes from "inventics" - a new discipline of knowledge, which explores problems of invention, creativity, ways of looking for new, non-conventional solutions etc.

The mission of the group should be representing users' point of view during a process of preparation and realisation of ICT investment.

The group should consist of employees, who have the following attributes:

- a work experience long enough to be familiar not only with formal but also with non-formal aspects of an organisation;
- an enthusiasm for innovations;
- an ability to see details as combined elements of a complex system;
- an ability to separate important problems from not important ones.

Next, members of the invention group should estimate values of adequate reserves using a balance methodology as it is shown in the figure 3 below. Practically it means collecting answers to questions listed below and elaborating them into homogeneous set of conclusions.

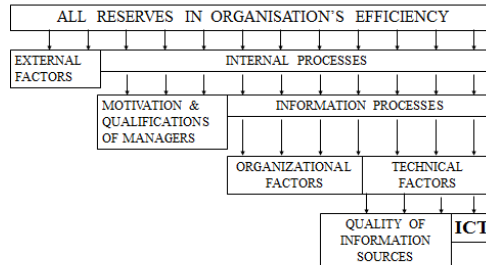


Fig. 3. A balance's estimation of reserves in succeeding levels of the proposed analysis.

The efficiency of company's activity

What are the criteria for efficiency of company's activity?

How to assess the efficiency of company's activity in comparison to similar companies in the same industry?

Which external factors put a limit on efficiency of company's activity?

To what extent company's activity is determined by 1 external limiting factors and 2 efficiency of its management system?

What are the company's chances of success?

The efficiency of the management system²

1- Does the existing motivational system result in complete targets identification for individual employees and the whole company?

2- Whether by modifying the management system it would be possible to achieve growth in company's efficiency? How big would be this progress?

3- Does it happen that employees distort or don't communicate certain information relevant to company management?

4- How do you assess your working atmosphere?

5- Does the level of qualifications of the management team and staff corresponds to problems resolved in a company?

6- Whether by offering a proper training (or possibly by replacing part of the staff) would be possible to enhance the efficiency of the management system? How big would be this progress?

² The interesting method in this field was proposed by Paul Strassman in his classical book "Business Value of Computers". He has proposed "Return on Management (ROM)" as a specific ratio expressing (analogically as many business ratios to assess the payback from financial resources) for the another very much important organisation's resource – its managers' time and attention. A construction of the ratio is as follows: ROM = productive organisational energy released / management time and attention invested

In other words - ROM measures how well managers are keeping themselves and their employees focused on strategy implementation.

The efficiency of the information system

Is it difficult to obtain information? If yes – to what extent? What are the causes of these difficulties?

To what extent it is possible to overcome such difficulties through ICT?

The efficiency of the organizational structure

Does the company's organizational structure result in unnecessary delay and complexity of information flow? If yes – to what extent?

In your opinion, does the current degree of centralization in management is appropriate or too small, or too big? To what extent formal decision rules are applied?

Does the excessive bureaucracy of regulations exist?

Does the localization of various organizational units is correct?

Technical factors

To what extent the technical efficiency of the information channels is limited by insufficient level of language formalization in the company ?

- Symbols
- Normative base
- Documents' abase

What could be achieved by formalizing the language of organization (improving an index base, a normative base and a documents' base)?

To what extent the technical efficiency of the information channels is limited by insufficient level of technical equipment (quantity and quality of computer hardware and software)?

What could be achieved by upgrading the information channels by improvements of their technical equipment?

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