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Knowledge-Based Assessment System for Investment Conformity

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Abstract

Investing in IT as a means of survival of a company has become an essential element, and its size is also increasing. The importance of pre- and post-evaluation of performance has also increased in proportion to the investment scale of IT. So far, the pre-validation evaluation method of IT investment cost appropriateness has been selected as evaluation model, IS Success model, Gartner Group TCO (Total Cost of Ownership) model, McKinsey's TVC (Total Variable Cost) model, performance reference model and Balanced Scorecard (BSC) And the Excellence model of the UK have been devised and applied. However, there are not many studies on the basis of judging the appropriateness of investment cost. If you conduct a review of your investment and costs in the process of applying your business by applying more systematic and intelligent knowledge - based standards, you will be able to handle your business more reliably and efficiently. In this paper, we propose a pre-evaluation system, methodology and application examples, and reconstruct the process, indicators, and measurement techniques in a methodological way, so that it is possible to more intelligently determine the appropriateness of the investment cost and how to use it.

Keywords: *IT Investment, Cost, Knowledge Management, Intelligence, Conformity Assessment System*

1. Introduction

As the input budget for IT increases and the range of support for enterprise projects grows, [1]interest in IT performance and evaluation is growing. This study is an empirical methodology for the preliminary verification of specific and practical IT investment costs required by the business. It confirms the pre-evaluation system, procedures, and application cases performed by A company and complements the process, The methodology. The case of company A represents the case and system of pre - evaluation of investment cost of private enterprise respectively. The pre-evaluation methodology is divided into three stages. In the first step analysis of the investment cost feasibility, the validity of the proposed informatization plan is judged from the viewpoint of faithfulness, commitment, investment cost, redundancy, procurement possibility, and risk. In the second step, the validity of IT effectiveness is analyzed from the technical, economic and strategic perspectives. In the third step, the evaluation results of various aspects are quantitatively synthesized and scored. This methodology includes years of know-how and proven guidelines from A, and in particular, this quantification technique can provide a useful reference model for prospective reviewers of various companies. In the meantime, it will provide a comprehensive solution to the questions that various companies

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have raised individually. In the past, there were differences in the performance indicators developed for each institution or company, resulting in lower objectivity of evaluation and difficulty in comparing performance between projects[4]. In terms of economic productivity, there is a limitation in explaining the process of creating IT outcomes and not being able to explain how the IT is performing through the process by paying attention only to the direct relationship between investment and productivity [13] [14]. A company that represents the evaluation case of a private company can provide a useful reference model and actual information for the pre-evaluation staff by including the proven processes, indicators, and quantification techniques. This study aims to explore the problems and problems of the IT performance evaluation presented through previous research and to find solutions to the problems by improving the performance evaluation methods.

2. Related Research

The pre-assessment of IT investment refers to a series of activities that analyze the feasibility of the proposed IT plan in advance and support the investment decision of the organization. Recently, the importance of the pre-evaluation is increasing as the size of the information budget is continuously increasing and the scope of informatization project is spreading to atypical and unstructured tasks. However, in spite of this importance, the pre-evaluation carried out in the field has not yet reached the maturity level. Therefore, the prior evaluation itself must be carried out poorly, and the reliability of the resultant product is inevitably low. The pre-assessment methods of IT investment include assessment evaluation model, IS Success model, performance reference model and Balanced Scorecard (BSC) based performance evaluation model, Malcolm Baldrige model and the Excellence model of the UK. In order to make an intelligent IT investment preliminary evaluation, Application Map analysis for the entire system of the enterprise is required, and appropriate items for each investment case should be classified and defined. After the database is prepared in advance, interviews are needed to acquire the working experience of the personnel who prepare the preliminary IT investment data. In the beginning, it operates as Excel-level management, and if it accumulates operating experience, it can systemize and improve efficiency more.

2.1. Assessment Evaluation Model

In the most traditional and universal way, the UK government created a central policy review team in the early 1970s. In the 1980s, it was developed as an analysis of Japanese local autonomous entities and the self-governing IT projects of Korea, and it became the basis of the policy evaluation evaluation, but it has limitations in measuring the overall performance as an evaluation form mainly focused on the input or process stage [5] [7] [21].

2.2. IS Success Model

A typical evaluation model is the IS Success model proposed by DeLone & McLean [2] [3] [22]. This model analyzes the existing research results and categorizes the information system success indicators into six categories. These six indicators are 'system quality' which is the technical function to process information, and information accuracy, timeliness 'Information quality', 'use of information system', 'user satisfaction', 'cognitive response of information system users',' individual impact ', and 'organization impact ', which is an effect on the entire organization. IS Success model basically corresponds to input of system quality and information quality as technical achievement. In technical performance, it defines specific

purpose of IT investment and definition of target system, business management for development process, Suitability, etc. Intermediate performance can be defined as an essential process for producing final performance [22] [23] [24].

2.3. Performance Reference Model

In order to evaluate performance, not only technical output such as information system, but also business performance such as change of process through informatization investment, improvement value of process such as process improvement, achievement of management goal of institution [13] [23]. To this end, the performance reference model(PRM) developed by the Korea Information Society Agency(KISA) has become popular, providing a basis for more detailed understanding of IT performance(Korea Computerization Agency, 2005). The performance reference model classifies the types of performance as input, output, and outcome by classifying the system of rating classification, and the causality is formed between these outcomes, and the performance appears as time lag. While it is possible to evaluate the technical performance(inputs) immediately after the completion of the system development, the process improvement(output) and outcome are possible only after a certain level of knowledge and utilization of the new information system has been reached. Therefore, it is necessary to reflect various types of performance in the evaluation of informatization performance, and it is necessary to select appropriate evaluation targets according to the evaluation time. However, the interest and importance of informatization performance has been emphasized, and detailed efforts on how to produce informatization and produce concrete results have been insufficient [8] [9]. This has caused problems to be solved by technical issues on the performance of informatization [15] [21].

2.4. BSC Model

IT policy has the aspect of enhancing national competitiveness by utilizing information and communication technology at the national level, and it is a way to efficiently perform the assigned mission at the individual organization level. As a method for this, we use a number of Balance Score-Card (BSC) models proposed by Norton & Kaplan [6]. In order to improve the performance of the organization, the BSC model considers the customer side, the internal process side, and the learning and growth side in addition to the overall dimension, ie, the financial side, rather than evaluating the performance from the traditional financial and economic aspects [12] [18]. This model is a method that was introduced in the early private sector. It is used to apply the public sector's vision and strategy, viewpoint (finance, customer, internal process, learning and growth perspective), core success factor. An objective model based on organizational characteristics, feedback, and so on. We consider the customer and industry (company) as customers and use economic factors such as cost reduction in terms of budget instead of financial value.

2.5. Gartner Group TCO Model

In 1987, the Gartner Group introduced the IT cost model, which identifies the entire lifecycle of the cost of acquiring, retaining, and using IT services [1]. In addition to direct costs such as H / W, S / W, etc., there are intentions to include management costs and indirect costs such as education costs. Today, IT has been adopted throughout and has become a sustainable management process for measuring IT budgets, measuring costs, simulating and improving functionality [10] [11]. Advantages include cost savings, improved productivity, better

planning, and improved value as a means of decision support. The disadvantage is that lack of efficiency, risk and flexibility can lead to distortions in IT investment decisions.

2.6. Mckinsey's TVC Model

The total cost of all businesses consists of fixed costs and variable costs. Fixed costs consist of rent, employee benefits, insurance and office supplies, all of which remain the same regardless of production. Cost savings usually mean a reduction in variable costs, and Mckinsey's TVC(Total Variable Cost) model seeks to increase profits by reducing variable costs. The company tries to reduce the variable cost of raw materials, direct labor and advertising, which can adversely affect the quality of a product or service . As a result, reducing variable costs increases gross profit or profit.

2.7. Malcolm Baldridge Model

In the United States, they are spreading and sharing best practices of excellent companies with the highest quality management award, which is awarded to companies that have implemented the best quality management at the national level in order to raise the quality level of enterprises nationwide. Motorola was selected as the first company in 1988 to become Six Sigma, and the company was awarded the first prize of 1,000 points in seven major items(market and customer, leadership, strategic planning, human resources, process management, information and analysis, management performance).

2.8. Model Excellence Model

It is an evaluation system run by the UK Quality Foundation and is a comprehensive framework for assessing strengths and areas of improvement throughout the organization. This can be accomplished through superior processes in terms of customer performance, employee performance, leadership in managing partnerships and resources, and core performance [19] [20]. In the 1980s, it was developed through the analysis of Japanese local autonomous entities and local autonomous IT projects in Korea, and became the basis of policy evaluation. There is a limit to measuring overall performance as an evaluation form. The focus was on the input stage or the process stage [16] [17].

3. Main title

Generally, companies establish the basic principles of investment review for optimal investment in IT and have an investment deliberation process in accordance with them.

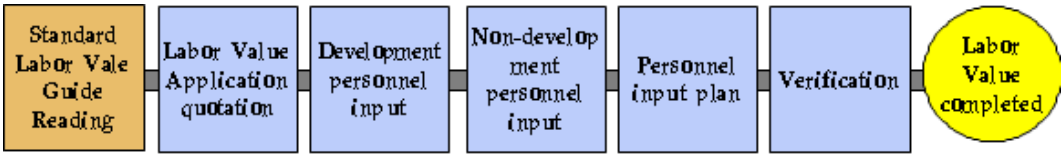

Figure 1. Standard labor value Assessment Procedure

The standard airborne calculation procedure according to the preparation guide is the order of standard airborne calculation, functional manpower input, non-functional manpower input, total manpower input planning and verification as shown in Figure 1.

4. Case Study

In case of Company A, the contents and procedures for the consideration of investment costs are shown in Table 1.

Table 1. Contents of deliberation

Item	Contents
Deliberation History	Item name, amount of deliberation, confirmation within and outside the budget of the division, cost attribution department, purpose of execution, target service, schedule
Investment Effect	Quantitative (definition of indicator, indicator/formula, target value, measurement date), qualitative effect
Item Details	The division and execution time of investment(development labor cost, H/W, S/W item quantity, amount, selection method/vendor), cost(account name etc.)
Detailed Schedule	Displays the monthly staffing plan and adds comments from related departments
Attached Document	MM (Man-Month) verification summary, system diagram, quality indicator(SLA -Service Level Agreement / CTQ - Critical To Quality), product/vendor selection reason sheet, reason for IT integration ordering, new API (Application Program Interface) details, PoC (Proof of Concept) / BMT (Benchmark Test) evaluation, etc.

Check the amount, purpose and schedule according to the agenda as shown in Table 2, check the quantitative and qualitative effects, investment, cost and timing of execution, and finally describe the opinions of the related departments. MM verification summary, system configuration, quality index, reason for product / vendor selection, and PoC / BMT evaluation details.

Table 2. Basic ability and development scale standard

Item	Contents
Basic ability	Level 1 - Business / system name, Level 2 - Main job, Level 3 - Screen Name, Level 4 - Unit Process Name
Development Scale	Reflect change rate - New category: new, change, new recycle change rate Participation of special personnel, contribution of special personnel Features This attribute definition - Development type Processing type: Online, Batch Feature Type - View, Modify, Enter, Delete Difficulty - C0, C1, C2, C3, C4, C5 Standard labor – MD (Man- Day), MM MM-analysis by development process MM, design MM, development MM, integration test MM Change rate calculation criterion - Required if over 20% Criteria for calculation of difficulty level - Required for C3 difficulty level or higher

For the standard labor calculation by unit process, the basic ability and development scale are calculated. We evaluate the development scale considering the difficulty of implementation. In Company A's B division uses a different method. Because of the large number of newly developed services, we use a method to quantify a certain percentage of the total investment cost through the analysis of existing Big Data. The contents of the deliberation check the information such as MM calculation and difficulty, developer rating, design analysis, testing, PM, security and architecture, final investment cost and development schedule. For example, if the investment cost is between 100 million and 500 million, the PM and analysis / design costs are set at 5% and 15%, and then the total investment amount is determined. But it may be somewhat insufficient in terms of sophistication.

5. Conclusion

Although several models are currently used in the preliminary evaluation of IT investment costs, there is still a shortage of practical effects in collaboration. Therefore, using the knowledge-based system presented in this paper will achieve good results. In the process of pre-evaluation of IT investment cost, which is simple and repetitive every time, by using pre-defined well-defined knowledge base application map and selecting the module most similar to the system to be invested, the items to be intelligently applied are automatically displayed. Much effort can be reduced if only the cadastral area part (e.g. MM to be input) is entered. The most important part to keep in mind when applying it is how to divide the size of the module in an appropriate size so that it can be easily applied intuitively. This should be discussed and confirmed by top experts in the field. Of course, there will be trial and error in operation, but if it is continuously improved and supplemented, it will be a better system and trying to intelligence of this knowledge base alone will increase the quality of the IT investment cost preliminary evaluation system. Applying the knowledge - based intelligent method presented in this paper will actually help the business. However, it is the limit of this study that only two cases operated by A company were applied, so that more empirical data could not be applied. If we add more examples of companies, we can get more advanced results.

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