The Use of Knowledge Value Added to Weigh the Performance of Information Technology Outsourcing

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Abstract—In order to obtain the advantageous position in the environment with keen competition, Information Technology Outsourcing is one of the models that the enterprises usually adopt; generally, the enterprises also believe that information technology outsourcing is the best method to save the cost and lower the overall expenditure. In the previous studies, there are not many related literatures or studies that would confer each of the procedures after information technology outsourcing, and whether there is any change on its knowledge amount and rate of return. Therefore, this study uses Knowledge Value Added (KVA), which is addressed by Housel & Bell, to quantify the knowledge that is contained in each procedure before and after information technology outsourcing, and then the differences are being compared in order to regard as the performance assessment of information technology outsourcing.

The learning time and procedure description of KVA are used for the estimation of knowledge amount within the procedures, where in-depth interviews are carried out with three listed companies and their public financial statements are used to assist with the cost analysis, so as to obtain every department's KVA value, and Return of Knowledge (ROK) can then be obtained. The result of the study found that besides cost saving and lowering of the overall expenditure, the information technology outsourcing can gradually raise the knowledge amount and rate of return that are included in each procedure year by year with regard to the enterprises.

Keywords: Information Technology Outsourcing, Knowledge Value Added, Return of Knowledge

I. INTRODUCTION

In order to obtain the advantages in the global competition and improve the competitiveness of organization faster, many enterprises’ demand of information technology’s related support has been greatly increased. From many of the research documents and cases in the past, one could know that the agitation of information technology outsourcing began in 1989, in which Eastman Kodak shifted and outsourced the entire database, network and computer operation to three external companies [11]. Because of Eastman Kodak’s successful outsourcing experience, the enterprise circle begins to pay much attention to the possible benefits that might be brought by the activities of information technology outsourcing; in the past 20 years, because of all sorts of factors, such as global competitiveness, reducing expenses, urging the organization to feel satisfied, lowering the demand of costs, improving service quality and transportation, improving the organization’s focus, and emphasizing the key competitiveness so as to increase the elasticity of organization, because of all these factors the demand of information technology outsourcing has rapidly grown within the industry [5][1]

For the sake of obtaining the advantageous position in the environment with keen competition, information technology outsourcing is one of the models that the enterprises usually adopt. Because the enterprises generally believe that information technology outsourcing is the best method to save the cost and lower the overall expenditure; in addition, taking a broad view of existing relevant documents and researches in the academia, they mostly used the organizational theories or economical viewpoints to confer the important, successful, and essential elements of outsourcing’s partnership, agreement, selection, and introduction, so most of the assessments of information technology would begin with these viewpoints; however, for many investments of information technology, it is unable to weigh the economic benefits that information technology could bring from the economical angle, especially the invisible benefits or influences produced after introduction, such as the transformation of organization, concentration on the core ability, and promotion of competitive advantage, are difficult to display objectively using the data and quantified methods. Even so, it is necessary to allow the manager or investor to clearly understand information technology outsourcing does not only have a certain degree of contribution towards cost saving or human resources simplifying, but the invisible benefits brought to the organization also have a certain degree of influence, then during the investment of information technology, one can convince the manager or investor to raise the desire of adopting information technology outsourcing; therefore, information technology outsourcing must be quantifiable and it is necessary to collect the information under a common weighing unit. Only this method can be used to track and manage information technology outsourcing with regard to the contribution of value creating.

II. LITERATURE REVIEW

A. Information technology outsourcing

Willcocks, Lacity & Kern [19] defined information technology outsourcing as follows: Via the way of contract or selling out, the enterprise hands over the entire or part of the company’s information technology assets, employees, or
activities to the outsourcing supplier that is outside the organization, then this supplier would provide the management and services strategic decisions of information technology for the organization in a certain time and under certain fees. And Chen JiaWei [4] thinks information technology outsourcing should be defined as “in way of concluding of a contract, the enterprise shifts the responsibility of its original information system’s specific scope to the external information service provider after considering the organization’s own resources and management tactics, and then a partnership that is mutually beneficial should be established.” And with the changes of era and information demand, every scholar has different viewpoint about the definition of information technology outsourcing. From numerous scholars’ definitions in the past, one can find the final purpose of outsourcing is to improve the organization’s own competitive advantage, and then impel it to reach an expected degree of success or obtain a certain degree of benefits from it. But the result of outsourcing does not have absolute success, the expenditure cost and the retrieving benefit might not be directly proportional; therefore, the considering factors of outsourcing plays a decisive role in the course of decision.

For the aspect of information technology outsourcing’s application theory, a lot of scholars often use organizational theories or economic viewpoints while setting up its basic idea structure, such as transaction cost theory [15][18], resource dependence theory [10], resource-based theory [7][3][16][17], agency cost theory [6], and social exchange theory [8], so as to probe into the topic of information technology outsourcing. From the above-mentioned various kinds of economic and social theories, one can know that among most of the reviews about information technology outsourcing, there are some reviews that involved the studies of performance, but most of them do not concentrate the attention on the quantifying aspect for analysis. Because the previous scholars had used the knowledge value added to confer the knowledge quantification’s difference after the enterprise introduced the knowledge management, so this study will make use of the knowledge value added to analyze and compare the differences before and after the enterprise carrying out information technology outsourcing.

B. Knowledge Management

Beckman [2] defined knowledge as “knowledge is the relevant information and materials, and can be putting into the implementation, solving the problem, making policy, studying and teaching the inference course”. So, the middle course from the collection of materials to the transformation of knowledge, regardless of individual or enterprise, it can be said to be the production procedures of the value added and creativity, namely, knowledge is the information that is valuable to people.

In the past, many studies discussed how to use Internet information technology to promote enterprises so as to lift work efficiency, reduce interaction cost, and promote the work outcomes of groups, all these are embryonic concepts of knowledge management. Since the Internet develops rapidly from 1995, the intension of knowledge management is not a new idea anymore, and there is a close relationship between the development of information technology and knowledge management. For the information technology methods that can be used in knowledge management, there are still spaces for development. But according to the studies in the past, they discovered that shifting the knowledge assets to information technology could obviously gain many benefits, but the following two basic principles must be conformed first [14]: First, the knowledge that is suitable for shifting to the information technology is usually the knowledge that is simpler, more procedural, and needed to be used repeatedly. The second is that the knowledge with higher mobility will be the main target of collecting and embedding into information technology. In addition, the interior enterprise’s absorbability to new information is also the important factor of employing the external new knowledge successfully, the enterprise can also use this new knowledge correctly by applying to the foundation of existing professional knowledge at the same time[13].

Since the external environment of the organization’s operation changes unceasingly in recent years, and the technology that supports the organization’s operation is even at tremendous pace, so for the sake of promoting efficiency and competitive advantage, the organization must continue every new kind of management reformation in order to adapt the environment [12]. Especially in the era of knowledge economy, how to grasp these key knowledge and technology has become a very urgent topic. So this study bases on the concept of knowledge management, regard knowledge as the assessment unit of assessing information outsourcing, so as to quantify the value added that is brought by the outsourcing, and then one can assess whether outsourcing will truly bring the expected outcome to the enterprise or not.

C. Knowledge Value Added

Housel & Bell’s [9] study in 2001 addressed the theory of knowledge value added, and derived out the return of knowledge (ROK) from KVA. They believed that if knowledge can be quantified by “learning time”, then the input amount of knowledge can be regarded as the representative of product’s ability, with the increase of knowledge introducing amount and the handling procedures of value added, the product’s ability can be increased and knowledge is the basic method and know-how of the creation procedure’s production. Lin DongQing [12] addressed the following four points with regard to the uses of knowledge value added (KVA) and return of knowledge (ROK) on management: understand the core’s most valuable position of knowledge, guide the effective disposition of knowledge resources, can carry out the benchmarking comparison between the internal and external organization, the staff and managers understand the value of the work procedures more. Housel & Bell also believed via more thorough ROK analysis, one can often find some highly informatization procedures with ROK that has lower procedures than other informatization ratio. And the use of learning time to estimate the knowledge content is a more objective way. Therefore, having a common weighing unit for reference is an essential condition for developing the knowledge weighing framework. Once each return of knowledge has been calculated, the manager can study and
draft the precedent tactics on how to use knowledge assets to improve the whole enterprise’s performance. Therefore the essence of KVA is that it can change the knowledge that is used in the enterprise procedures into a quantity form.

This study hopes that with KVA, it can use the data form to objectively display the knowledge that is difficult to quantify in the information system and enterprise procedures, so as to serve as the characteristic of comparison and weighing and then apply on information technology outsourcing. Therefore, when the enterprise and manager are assessing and comparing the company before and after information outsourcing, they not only consider the financial statements and cost comparison, but also the manager can profoundly understand if the procedures have any area that is needed to be strengthened or not, and the manager can clearly compare whether before and after information outsourcing will bring obvious rewards to the costs of the enterprise or departments.

III. THE DESIGN AND METHOD OF THE STUDY

The study methods of this study can be divided into literature analysis, collection of case materials, and in-depth interview which is complemented with questionnaire investigation. First, the related documents and cases of information technology outsourcing and KVA are focused, and then the initial study framework (Figure 1) is gathered and summed up. Then, with the interviewing procedures, each item will be corrected; the information analysis and questionnaire investigation are used to check the feasibility of the structure; finally, the ROK value of every procedure will be calculated. So, this study includes Qualitative Method and Quantitative Method in order to make the study result display a situation that is closer to the reality.

A. Study Structure

Figure 1 of Knowledge-Value-Added (KVA) is used in order to carry out the in-depth interviews with three listed companies, the value added after outsourcing is quantified and return of knowledge (ROK) is used to assess whether outsourcing bring the expected outcomes to the enterprise or not, so as to assist the managers and investors with the analysis and assessment of the change of the added returns from the procedures before and after information technology outsourcing. After confirming the case target of studying, the supervisors of each procedure are gathered and the related information that is required by this study is collected using Learning Time and Binary Query Method these two methods; learning time method will use the questionnaire, and each supervisor will answer the learning time ratio before and after outsourcing onto the questionnaire, while binary query method is that after retrieving the filled questionnaires, interviewing is adopted so as to carry out more detailed information collection in accordance with the questionnaire. Thereafter with the data from the questionnaires and interviews, the KVA values before and after information outsourcing are calculated; then the KVA values and the costs of each procedure within the department are used and the ROK values before and after outsourcing can be calculated; finally, the ROK values before and after outsourcing are used for information analysis.

IV. EVIDENCE-BASED ANALYSIS AND RESULT OF INTERVIEWING

A. The Analysis Result of Case A

This company is established in 1984, it is now under the jurisdiction of Taiwan South’s biggest semiconductor group of IC bonding and test, because the time the company established belonged to the initial stage of enterprise informatization period, the informatization development of the initial stage mostly lacked the overall planning, which resulted in the phenomenon of blindly introduced different applied systems, since there were lacked of standardized information interface definitions between most of the applied systems, so different applied systems would surely become the detached islands with separate information of each other. So this company introduced information integrated system in 2001. Information integration carries out the non-random integration on the information data of the business’s applied system, and the process of common use of business applied information data can be achieved. From Table 1, one can find out that after introducing the system, the “operation” field’s percentage of informatization has promoted from 90% to 98%, the “management” field’s percentage of informatization has promoted from 85% to 90%, the “manufacturing” field’s percentage of informatization has promoted from 80% to 90%; the number of employees has decreased from 1250 staff to 1200 staff; also the overall average return of knowledge (ROK) after information outsourcing has been promoted from 96.3% to 114%. Therefore the data can prove that there are substantial benefits to this procedure after introducing this system.

B. The Analysis Result of Case B

Case B is established in 1988, it has the most complete scanner production line in the world, which includes flatted and handheld scanners, digital cameras, and all sorts of professional image products, its brands occupied 75% of the overall operation.

From Table II., one can find out that after introducing the system, the “operation” field’s percentage of informatization has promoted from 42% to 90%, the “management” field’s percentage of informatization has promoted from 38% to 60%, the “manufacturing” field’s percentage of informatization has promoted from 20% to 30%; the number of employees has decreased from 336 staff to 300 staff; also the overall average
return of knowledge (ROK) after information outsourcing has been promoted from 137.3% to 145.6%. Therefore the data can prove that there are substantial benefits to this procedure after introducing this system.

### TABLE I. –THE KVA ANALYSIS OF COMPANY A’S INFORMATION INTEGRATED SYSTEM BEFORE AND AFTER OUTSOURCING \ UNIT: NTS MILLION

<table>
<thead>
<tr>
<th>Year</th>
<th>Core Field</th>
<th>The Ranking of learning difficulty</th>
<th>Relative Learning Time (100 Months)</th>
<th>Source of the materials: Taken from Company A’s financial statements of 2000 and 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>Operation 1</td>
<td>23 450</td>
<td>90%</td>
<td>137.3%</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>26 500</td>
<td>85%</td>
<td>134.2%</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td>33 500</td>
<td>80%</td>
<td>130.2%</td>
</tr>
<tr>
<td></td>
<td>Total Amount</td>
<td>100 1250</td>
<td>79%</td>
<td>127.6%</td>
</tr>
<tr>
<td>2002</td>
<td>Operation 1</td>
<td>27 400</td>
<td>98%</td>
<td>147%</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>40 950</td>
<td>92%</td>
<td>145.6%</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td>31 500</td>
<td>90%</td>
<td>137.3%</td>
</tr>
<tr>
<td></td>
<td>Total Amount</td>
<td>100 1200</td>
<td>95%</td>
<td>114.5%</td>
</tr>
</tbody>
</table>

### TABLE II. –THE KVA ANALYSIS OF COMPANY B’S ELECTRONIC BILL SIGNING AND VERIFYING SYSTEM BEFORE AND AFTER OUTSOURCING \ UNIT: NTS MILLION

<table>
<thead>
<tr>
<th>Year</th>
<th>Core Field</th>
<th>The Ranking of learning difficulty</th>
<th>Relative Learning Time (100 Months)</th>
<th>Source of the materials: Taken from Company B’s financial statements of 2002 and 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>Operation 1</td>
<td>27 450</td>
<td>90%</td>
<td>137.3%</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>33 400</td>
<td>85%</td>
<td>135.8%</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td>40 500</td>
<td>90%</td>
<td>137.3%</td>
</tr>
<tr>
<td></td>
<td>Total Amount</td>
<td>100 950</td>
<td>95%</td>
<td>114.5%</td>
</tr>
</tbody>
</table>

### TABLE III. –THE KVA ANALYSIS OF COMPANY C’S MES SYSTEM BEFORE AND AFTER OUTSOURCING \ UNIT: NTS MILLION

<table>
<thead>
<tr>
<th>Year</th>
<th>Core Field</th>
<th>The Ranking of learning difficulty</th>
<th>Relative Learning Time (100 Months)</th>
<th>Source of the materials: Taken from Company C’s financial statements of 2003 and 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Operation 1</td>
<td>20 250</td>
<td>90%</td>
<td>137.3%</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>25 250</td>
<td>90%</td>
<td>135.8%</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td>25 500</td>
<td>90%</td>
<td>137.3%</td>
</tr>
<tr>
<td></td>
<td>Total Amount</td>
<td>100 950</td>
<td>95%</td>
<td>114.5%</td>
</tr>
</tbody>
</table>

C. The Analysis Result of Case C

Case C is established in 1998, it is specialized in the production of thin film transistor-liquid crystal display (TFT-LCD), and the main application field is the monitor of notebook computers and desk-top computers. In 2004, this company used the Manufacturing Execution System (MES) that was established by the outsourcing supplier in the company’s factory officially, the main purpose of MES is to assist the production management personnel to collect the on-site data and control the on-site manufacturing procedures, to provide the enterprise with the tools of improving the production procedures and lifting the production benefits. From Table III, one can find out that after introducing the system, the “operation” field’s percentage of informatization has promoted from 45% to 89%, the “management” field’s percentage of informatization has promoted from 40% to 84%, the “manufacturing” field’s percentage of informatization has promoted from 38% to 95%; the number of employees has decreased from 1430 staff to 951 staff; also the overall average return of knowledge (ROK) after information outsourcing has been promoted from 145.3% to 147%. Therefore the data can prove that there are substantial benefits to this procedure after introducing this system.

V. CONCLUSIONS AND SUGGESTIONS

With regard to many information technologies’ investment, it is unable to weigh the economic benefits that information technology could bring from the economical angle, information technology outsourcing does not only have a certain degree of contribution towards cost saving or human resources simplifying, the invisible benefits or influences produced after introduction are especially difficult to assess. In addition the invisible benefits brought to the organization also have a certain degree of influence. Therefore, this study counters at this subject of debate and addresses KVA method, and provides the industry with another kind of assessment method.

The result of study found out that the overall ROK values of Case A and Case B before outsourcing are 96.3% and 137.3% respectively, after outsourcing the values have lifted to 114% and 145.6% respectively. From the data, one can know...
that with regard to the overall enterprise, information outsourcing can relatively raise the productivity of each functional field’s knowledge resources within the enterprise. Although the overall ROK value of Case C dropped slightly, but the reason is that the company introduced the MES system in 2004, and except the outsourcing fee, the company also had to purchase related computer hardware and facilities in that year, thus the expenditure cost relatively lifted the ratio on the net income and caused the ROK value of 2004 dropped slightly. Therefore, except the above-mentioned special reason that caused the operation field, manufacturing field and overall ROK value of Case C reduced slightly, while looking at other cases’ ROK values, one can find that besides cost saving and lowering of the overall expenditure, the information technology outsourcing can gradually raise the knowledge amount and rate of return that are included in each procedure year by year with regard to the enterprises.

Combining KVA method with knowledge management and information outsourcing, this study hopes to bring up a set of assessment method after information outsourcing that can be commonly accepted by the public, so as to provide the manager with clear and definite data for weighing the performance after information outsourcing. It can also provide the manager with another weighing indicator and carry out more diverse assessment, and then assist the manager to deploy the resources effectively, understand the knowledge amount and value of the organization, and finally lift the performance of outsourcing. However, because the data that this study needed involves the company’s internal confidentiality, it is quite difficult to obtain the information, and if the interviewing company retained some extent of the information then the result would be affected, therefore there is certain restriction on the acquisition of materials.

REFERENCES


