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Identification and Calculation Method of the Financial Benefits of IT Projects for Better Financial Evaluation

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Abstract

To financially evaluate an IT projects is to assess its financial feasibility, while the financial benefits are the core parameters of financial evaluation of IT projects. Therefore, correctly identifying the financial benefits of IT projects is the precondition to ensure the validity of the financial evaluation. Essentially, IT projects can be divided into productive IT projects and supportive IT projects. The paper analyzes the importance of identifying the financial benefits and introduces the meaning, characteristics and classification of financial benefits of IT projects. On this basis, the paper identifies the financial benefits of both productive IT projects and supportive IT projects and emphasizes the formation and specific calculation method of the two types of IT projects. For productive IT projects and supportive IT projects, the calculation of financial benefits should employ different methods.

Keywords: Productive IT Projects, Supportive IT Projects, Financial Evaluation, Financial Benefits, Benefit Identification

1. Introduction

In the process of decision-making and evaluation of IT projects, financial evaluation is an important work to determine the financial feasibility of the project. It is not only one important part of economic evaluation of projects but also the important basis for investment decision [1]. Financial evaluation needs to determine the financial parameters, while the identification of financial costs and benefits of IT projects is an important source to obtain the basis data for financial evaluation and that is what that influences the quality of IT projects decision-making [2]. The duration of IT projects is hard to estimate; meanwhile, unlike materials, machines and equipment, the labor costs in the process of implementation can not be exactly estimated because IT projects has the characteristic of intensive intelligence. Therefore, the financial costs and benefits of IT projects usually can not be easily and directly determined. Correctly identifying the financial costs and benefits of IT projects is a very important work.

2. The Meaning, Characteristics and Classification of Financial Benefits of IT Projects

2.1. The Meaning of Financial Benefits of IT Projects

The financial benefits of IT projects refer to the incomes that are generated after the implementation of projects and that are closely related with project target, which mainly refer to the operating income. Subsidy income obtained by some IT projects should be listed in financial benefits. Financial benefits of IT projects generally mean the income directly obtained, not including external benefits due to project construction and operation.

2.2. The Characteristics of Financial Benefits of IT Projects

1) Long time span of financial benefits

Financial benefits of IT projects occur in the O & M (Operation& Maintenance) period from the beginning of the implementation to the last. The time span of IT projects is comparatively long. The length of O & M period is mainly decided by national regulations or reasonable useful life of the project [3]. When there are national regulations of given period of IT projects, regulations should be followed; while there are no such regulations, it should be determined according to reasonable useful

life.

For a specific IT projects, its actual useful life may be very long. But When the IT projects O & M period exceeds a certain time, the present value of its financial benefits can nearly be ignored from the aspect of financial evaluation. The reason is as follows:

Suppose that the useful life of IT projects O & M period is t (t = 1, 2…, n), interest rate is *i*, the financial benefits generated in the year of t is FB. Calculate the PV (Present Value) of FB by the follow formula (1) [4]:

$$PV = \frac{FB}{(1+i)^t} \quad (1)$$

When *i* is certain, PV becomes close to zero as t increases. Generally speaking, the variable t often takes a value of less than 50 years. When O & M period lasts for 50 years, that is t = 50, consider *i* = 10%, then its discount rate is 1/(1 + 10%) 50 = 0.0085; thus the PV is so small that it can be eliminated. When *i* is certain, PV becomes smaller and smaller as t increases. When t is close to infinity, PV(FB) is close to zero.

2) More financial benefits generated by immaterial results and less financial benefits generated by material results

Results of IT projects are mainly existed by immateriality due to high technology and intellectual input of IT projects such as communication network and website construction [5,6], with little entity results. Therefore, financial benefits of IT projects are mainly from the sales of immaterial results.

2.3. The Classification of Financial Benefits of IT Projects

There are usually two purposes to set up IT projects. One is to establish a new information technology project without a specific organization in order to fulfill the process of electronic commerce and product development. The output can not be produced without the IT projects. This is a process from scratch and we call it productive IT projects. The other is to base the original organization on information, that is, an information application in an organization in order to support the original organization and make it run in a better and more efficient way. We call it supportive IT projects. Thus the financial benefits of IT projects can be accordingly divided into two types, one is of productive IT projects; the other is supportive IT projects.

3. Identification and Calculation Methods of Financial Benefits of Productive IT Projects

3.1. The Meaning of Productive IT Projects

Productive IT projects refers to a kind of projects established from scratch, taking one-time development and lifelong maintenance as its main way and possessing specific output for the purpose of the realization of electronic commerce, software product development and website construction in applications of computer software, hardware and communication network technology. There are four points in the definition above: firstly, productive IT project is a process from scratch and it doesn't have any organization as its basis. Secondly, productive IT project is a one-time activity and it needs to be maintained continuously from the construction to the end of project life cycle. Thirdly, the purpose of establishing a productive IT projects is to realize the development of software products and websites, therefore the products are inexistence and can not be obtained by other traditional projects before the construction of productive IT projects. Fourthly, productive IT project has specific outputs such as application software and websites with specific functions.

3.2. The Formation of Financial Benefits of Productive IT Projects

Financial benefits of productive IT projects are mainly revealed as operating income and subsidy income.

1) Operating income of productive IT projects

Operating income refers to the income from selling products or offering service and that is the main part not only in the cash inflow of cash flow statement but also in income statement [7]. Operating income is an important data in financial evaluation, the evaluation veracity of which can largely influence the estimation of project financial benefits. The operating income of IT projects mainly includes sales income and service income.

a) Sales income of productive IT projects. Sales income of productive IT projects refers to the cash inflow brought by selling the products of productive IT projects, mainly including advertising income, call income, value-added business income, registration income, rental income, installation income, sales income of client terminals, sales income of virtual currency, etc.

i) Advertising income. It refers to the income that productive IT projects especially website type IT projects charge to advertise for other companies through the page image and text links.

ii) Call income. Call income refers to the communication costs that productive IT projects charge to customers due to its functions like multi-communication, surfing, etc.. Generally speaking, call income includes call cost of fixed telephones and cell phones, broadband fee, GPRS flow charge, .etc.

iii) Value-added business income. It refers to the re-

venue obtained by the operators by the provision of a higher level information needs than basic communication needs. The characteristic of value-added business is that it can provide better service and can satisfy the personalized demands of different customers. So far, the value-added business on telecommunication network mainly includes e-mail, videotext, EDI, fax storage & transmit and so on [8]. 168 audio phone is a typical value-added business.

iv) Registration income. It refers to the cost that charged by productive IT projects for providing the usage of network, software or service.

v) Rental income. It includes space rental income, bandwidth rental income and so on.

vi) Installation income. When a productive IT project connects its backbone network with family terminal systems, terminal systems of commercial or educational organization, mobile terminal systems, .etc at the first time, it will charge for the access. For example, telecommunications network installation fees.

vii) Sales income of client terminals. It refers to the cost that the users of productive IT projects pay for client software in order to achieve the log function so that it can exchange information with the server terminals.

viii) Sales income of virtual currency. Virtual currency is a kind of electrical data or symbols which are issued on internet by network service operators to purchase virtual commodities or services provided by main service providers or contracted service providers [9]. There are many famous virtual currencies such as Q coins of Tencent, point certificates of SNDA, U coins of SINA, etc.

b) IT projects Service income. IT projects service income include advertising production income, upgrade and maintenance service income of client terminals .etc.

i) Advertising production income. It exists mainly in website type IT projects. The website advertisements are mainly represented by page images and text links, so the website operators can obtain benefit from providing advertising production for advertisers.

ii) Upgrade and maintenance service income of client terminals. After the installation of client terminal software, it is necessary to maintain the software as the update and upgrade of the project itself.

2) Subsidy income of productive IT projects

In order to fully play the role of market mechanism and achieve the market-oriented operation of IT projects, related government departments will give certain financial subsidy or loan discount to IT projects with the public good characteristics. Then such IT projects can obtain corresponding subsidy income according to some regulations. The subsidy incomes of IT projects include some government subsidy related to income, that is, value-added tax collected first and refunded last, ration subsidy calculated according to subsidy ration regulated by the government such as sales volume or workload and delivered on schedule, subsidies of other forms belonging to financial support.

3.3. Calculation Methods of the Financial Benefits of Productive IT Projects

The financial benefits of productive IT projects are generally visible, which can be calculated by some routine methods as are shown in **Table 1**.

4. Identification and Calculation Methods of Financial Benefits of Supportive IT Projects

4.1. The Meaning of Supportive IT Projects

Supportive IT projects refers to the project that can help organizations reduce costs, improve efficiency and enhance competitiveness in management in order to be seasoned with the present economic environment by applying computer software& hardware and communication network technology.

The meaning of supportive IT projects consists of four aspects: firstly, supportive IT projects progresses relying on certain forms of organizations. That is to say, organizations are in existence before the implementation of such projects. Secondly, the purpose of supportive IT projects is to help the organization improve operation efficiency by means of information technology. Before supportive IT projects is implemented, the original organization may have such problem as of low operation efficiency but it can still ensure the ordinary quality of products; while when supportive IT projects is in implementation, its operation efficiency will be improved. Thirdly, supportive IT projects mainly acts on organization management, which means that it can not help the organization produce new products but can help improve the management such as simplifying work flow, reducing information distortion and improving service quality. Fourthly, supportive IT projects can not change the original characters of the organization, just supporting it.

4.2. The Identification of Financial Benefits of Supportive IT Projects

Supportive IT projects doesn't have any independent output, with its value relying on the contribution to the organization. Therefore, the financial benefits of supportive IT projects can only be reflected by the difference between costs and benefits of the organization before and after the implementation of IT projects. In essence, financial

Table 1. Calculation methods of financial benefits of productive IT projects.

Financial benefits of productive IT projects				Calculation methods
Operating income	Sales income	Advertising income		(1) Unit price of standard complexity per unit time* complexity coefficient* number of ads* time
		Call income	Call cost of fix telephone and cell phones	(1) Call cost per unit time* call duration (2) Call cost per year* number of years (3) Call cost per month* number of months
			Broadband fee	(1) Broadband cost per unit time* call duration (2) Broadband cost per year* number of years (3) Broadband cost per month* number of months
			GPRS flow charge	(1) GPRS cost per unit flow * number of flow (2) GPRS cost per year* number of years (3) GPRS cost per month* number of months
		Value-added business income		(1) Value-added business cost per unit time* time (2) Cost per unit specific value-added business* number of specific value-added business (3) Value-added business cost per year* number of years (4) Value-added business cost per month* number of months
		Registration income		(1) Registration cost per user* number of users
		Rental income	Space rental income	(1) Rental income per time per space* time* number of spaces (2) Space rental income per year* number of years (3) Space rental income per month* number of months
			Bandwidth rental income	(1) Bandwidth rental income per time* time (2) Bandwidth rental income per year* number of years (3) Bandwidth rental income per month* number of months
		Installation income		(1) Installation income per user* number of users
		Sales income of client terminals		(1) Sales income of client terminal per user* number of users
		Sales income of virtual currency		(1) Sale income per unit virtual currency * number of virtual currency
	Service income	Advertising production income		(1) Advertising production cost of standard complexity per unit time* complexity coefficient* number of ads* time
		Upgrade and maintenance service income of client terminals		(1) Upgrade and maintenance service income of client terminal per user* number of users
Subsidy income				Calculated according to related regulations

benefits of supportive IT projects are mainly revealed as savings of organizational costs and subsidy income according to the principle of before and after comparison in benefits and costs identification.

1) The savings of management costs.

The savings of management costs include savings of labor costs, savings of paper costs, savings of error operations, savings of communication costs and savings of information acquisition costs.

Savings of labor costs refer to the labor costs reduced with the improvement of office efficiency through the application of IT technology. Savings of paper costs refer to the paper costs reduced by using electronic ways instead of traditional paper-based communication through the application of IT technology. Savings of error operations refer to the error operating loss reduced by less manual inputs due to the application of barcode technology and other related technologies. Savings of communication costs refer to the communication costs reduced by using networks and e-mail systems instead of traditional means of telephones and faxes to connect the inner and outer organizations. Savings of information acquisition costs are brought out by the open network and shared information, so it is very cheap for organizations to acquire information by IT systems. That is to say, the implementation of IT projects can effectively reduce the information acquisition costs.

2) The savings of production costs

As a means of factor allocation in production process, IT projects can help improve the efficiency of factor allocation, reduce the costs and to some degree it can avoid or decrease the phenomenon of materiel shortages and production interruptions, consequently with higher production efficiency, lower production costs and more benefits.

3) The savings of sales costs

The savings of sales costs include savings of transaction costs, savings of marketing and promotion costs and savings of customer service costs.

Transaction costs are generated in the process of commodities distribution and wholesale. It is not the part of production costs, but it can reflect the market demand and supply. As the increase of product sales, transaction costs will increase [10-12].

Marketing and promotion costs are spent to publicize the products to customers in order to broaden the product sales in the business activities characterized by equivalent exchange. By using information technology, IT projects can publicize products faster and more efficient compared with traditional marketing and promotion methods. Therefore it can help improve the marketing efficiency and reduce costs.

The implementation of IT projects can make the communication between enterprises and customers more convenient. It can advance customer relationship, improve customer satisfactory and loyalty [13,14], thus reduce the customer service costs.

4) The savings of financial costs

The implementation of IT projects can accelerate the cash flow and can withdrawal account receivable in advance, which makes possible to reduce bad debt and financial costs.

5) The savings of procurement and inventory costs

The implementation of IT projects makes it possible to achieve Global sourcing, real-time procurement and bulk purchases. Enterprises can integrate all the procurement information by internet and invite biddings all over the world in order to choose preferred suppliers; they can make real-time procurement to minimize inventory through connecting production information, inventory information and procurement systems together; It is possible to fulfill the automatic and scientific management of inventory and procurement and meanwhile minimize the influences of human factors with a higher procurement efficiency. The procurement and inventory costs reduced are the savings.

6) Subsidy income of supportive IT projects

Subsidy income of supportive IT projects is almost the same as that of productive IT projects, which should be calculated according to related regulations.

4.3. The Formation of Financial Benefits of Supportive IT Projects

On the basis of the identification of the financial benefits of supportive IT projects, its formation can be listed in **Figure 1**.

4.4. Calculation Methods of the Financial Benefits of Supportive IT Projects

According to the difficult degree of financial benefits calculating, we divide supportive IT projects into two types. One is type I supportive IT projects whose financial benefits are easy to calculate through routine methods. The other is type II supportive IT projects whose financial benefits are hard to determine.

1) Calculation methods of the financial benefits of type I supportive IT projects

The financial benefits of type I supportive IT projects can usually reveal in a short time, therefore we can use the costs difference between before and after to calculate its savings.

One typical example is the GPS information system project of logistics companies. The adoption of GPS can help reduce the number of traffic accidents of transport vehicles as well as their no-load mileage. What's more, drivers can better find the best routine, which makes it even possible to decrease the transport costs. Therefore, its financial benefits mainly rely on the savings as follows: one is the costs reduced with decreased traffic accidents, which can be calculated by statistic data of the

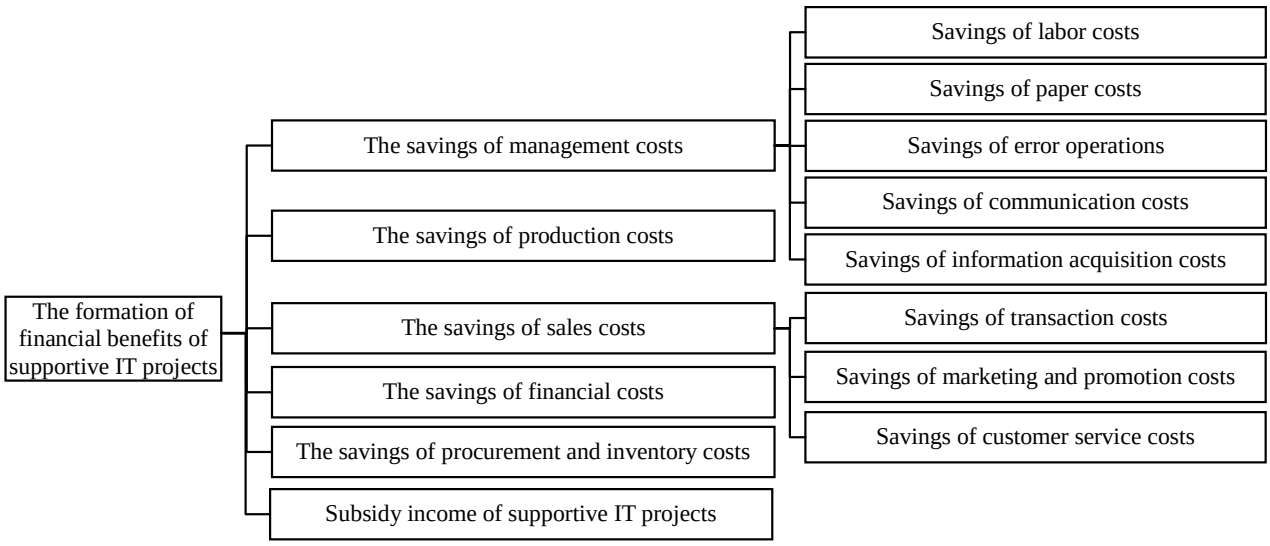

Figure 1. The formation of financial benefits of supportive IT projects.

accidents; the second is the costs reduced with decreased transport mileages which can be calculated by the odometers.

2) Calculation methods of the financial benefits of type II supportive IT projects

The financial benefits of type II supportive IT projects usually can not reveal soon. On one hand, the savings of project costs can not be represented in a short time; on the other hand, the improvement of management efficiency can not be simply measured by cost reduction. Therefore The financial benefits of type II supportive IT projects can not calculated by routine methods.

Take the establishment of schools' information office system as an example. Office information system generally has the following functions: firstly it can reduce the amount used of office supplies such as papers and pencils; secondly, it can help reduce the number of management employees that are not necessary for automatic offices; thirdly, it can improve the information transmission efficiency in the organization. The third is the key function of this project, while the improvement of efficiency can not calculated by routine methods. It is not easy to exactly determine its financial benefits.

One feasible calculation method of the financial benefits of type II projects is cased-based reasoning. In the calculation of financial benefits, the major idea of cased-based reasoning is to set up a case base according to the financial benefits of similar IT projects actually happening before, and then compare the differences in their characteristics such as scales, characters, time etc. between the new and old projects. After a series adjustments and modifications of those differences, reuse the related information in the case base to calculate the financial benefits of the present IT projects. When there is only comparability between the project to be settled and the old projects in the case base, an suited choice should be found. That is a process of optimal matching. Optimal matching is to select one or several cases best related to the present problem from a group of candidate cases obtained in the first matching process.

The similarity measurement plays a very important role in case searches. Similarity measure methods include fuzzy relational clustering, single linkage clustering and so on. Similarity computation formulas are as follows [15]:

$$Sim(V_i, V_j) = 1 - d(V_i, V_j) = 1 - d_{ij} \quad (2)$$

$$d_{ij} = \left| V_i - V_j \right| \quad (3)$$

In formula (2) and (3), $Sim(V_i, V_j)$is the similarity between V_i and V_j; $d(V_i, V_j)$represents the distance between V_i and V_j.

The greater the distance between cases, the smaller the similarity. Through calculating similarity and searching the case base, the cases should be ranked in accordance with the order of similarity decreasingly.

5. Conclusions

1) Financial evaluation is an important work to determine the financial feasibility of the project and also an important basis for investment decision. The identification of financial costs and benefits of IT projects is an important source to obtain the basis data for financial evaluation and that is what that influences the quality of IT projects decision-making.

2) IT projects can be divided into productive kind and supportive kind. Accordingly, the financial benefits of IT projects can be accordingly divided into two types, one is of productive IT projects; the other is supportive IT projects.

3) Financial benefits of productive IT projects are mainly revealed as operating income and subsidy income, which can generally be calculated through routine methods; financial benefits of supportive IT projects are mainly revealed as savings of organizational costs which should be identified according to the principle of before and after comparison.

4) According to the difficult degree of financial benefits calculating, we divide supportive IT projects into two types. Financial benefits of type Ⅰ projects can be determined by routine methods, while type Ⅱ can not. It is suggested that case-based reasoning be introduced to calculate the financial benefits.

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