

How to Calculate the Cost of IT Educational Systems

**Seyed Jafar Sadjadi and
Parisa Mokhtar Maleki**
*Department of Industrial
Engineering, Virtual Unit,
Iran University of Science &
Technology, Tehran, Iran*

Masoumeh Bodaghi
*Department of Industrial
Engineering, Amirkabir
University of Technology,
Tehran, Iran*

sjsadjadi@iust.ac.ir,
pamomaleki@yahoo.com

Abstract

IT education has become one of the fastest growing educational systems for the past few years. The learning process has attracted many people through the world to participate in such programs and the steady growth of this market has created competition among many organizations. The primary purpose of this research is to find out more about the most important components of IT based educational system. The proposed model of this paper proposes some statistical models to estimate the cost of IT education using the necessary information of three universities. The results of our survey indicates that cost of sharable content object (SCO), Instructors, software & licensing items are the most important cost components of this education system.

Keywords: IT based educational system, ABC cost accounting, e-learning, Sharable content object (SO)

Introduction

The internet revolution changed the face of many businesses around the world during the past two decades and many businesses have changed their strategies to take advantage of the new opportunities using Web based applications. Information technology (IT) based educational systems have created significant advantages by removing the physical distances, ease of access and participation (Pholen & La Londe, 1994).

The basic concept of e-learning goes back to 19th century, where there were some distance learning schools, which were established in United States and some European countries using post office facilities.

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In fact, the first type this collegiate distance learning based post office was built in 1892. During the early years of 20th century, there were also varieties of educational programs, which was offered to different audiences. Since then, e-learning has made remarkable changes since many people from different countries could take part in such courses from virtually totally

different countries. They could share their ideas and learn from their expertise in management level skills. There were also many conferences held through internet facilities and people participated in such programs without bothering to spend significant amount of traveling expenses.

The idea of having IT based facilities is to prepare some shareable content object (SCO) once and used them in different terms. In fact, there are many basic courses in engineering and basic sciences, where the SCO does not need to be updated, significantly. Examples of this type of SCOs are linear algebra, calculus, differential equations, fundamental of basic physics, etc. These courses are mainly common in many fields and instructor can prepare the content with many features once and the product can be used within the organization or it can be sold, leased or rented to other organizations. However, there are some other courses, which require tremendous changes over time. These courses involve require materials based on the changes in market activities. Investment based course materials, management accounting, business strategy are examples of this type of activities.

One obvious advantage of using SCOs is to distribute a big portion of teaching materials over the internet, which lowers the cost of learning as much as possible. Studying through internet reduces many cost component items such as physical places, accommodations, etc. There are many university professors across the world who are interested in participating in such programs though internet facilities. This makes it easy to absorb professional people across the world to share their ideas creating remarkable value added IT based educational system (Baykasoglu & Kaplanoglu, 2008).

The other advantage of IT based educational system is to prompt international studies where people with different nationality participate in a common program. This would create tremendous opportunities for sharing people's knowledge and experiences through a common platform. These days, many talk about some common problems surrounding our planet such as global warming, recent turmoil in economy, etc. and IT based educational system could help human nation share their ideas and their insights.

As we can observe, there are many advantages of IT based educational system either directly or indirectly through and this would create an opportunity for many traditional based universities to extend their businesses by establishing such units. However, when there is value in some places, we must expect some competition as well and one primary question is to find out how much an IT program would cost for a traditional university to find out more about pricing strategy.

Traditional method for computing the expenses of IT based educational system does not give us reliable results since, as we explained, different courses have virtually various dynamic contents.

There are other parameters influencing the cost of IT based educational system such as the cost of infrastructures, software and hardware equipments, etc. Therefore, we need to use a reliable method such as activity based cost (ABC) technique to measure the cost of IT based educational system. ABC is an interesting costing model, which determines activities and assigns the cost of each activity with resources to all IT based services according to the actual consumption by each. The ABC technique assigns more overhead costs into direct expenditures compared to traditional costing models (Van Damme & Van Der Zon, 1999).

Without a doubt, a detailed analysis on the cost of production helps IT based organizations choose suitable programs and ABC method contributes for making better managerial decisions. These days, there is an increase in competition among universities offering IT based programs (Agrawal & Mehra, 1998). To provide lower costs, exact cost information is essential for every aspect of business, and it affects the pricing policies and performance reviews (Gupta & Gallo-way, 2003). According to Nachtmann and Al-Rifai (2004), ABC helps many service organizations make better decisions based on precise information of the cost of final products or services.

There are several implementations of ABC in different organizations and their outcome decision processes (Dhavale, 1993; Kirche et al., 2005; Koltai et al., 2000; Özbayrak et al., 2004; Satoglu et al., 2006; Zhuang & Burns, 1992). ABC was first used in late 1980s by Cooper (1988a, b), Cooper and Kaplan (1988) and Johnson and Kaplan (1987). Direct and indirect expenditures are based on cost calculation of the IT based services in traditional costing to find the individual expenses of each element. Traditional cost accounting collects indirect expenses from various units and then assigns them to products or services (Tsai & Kuo, 2004) but ABC technique is used when the overhead expenses is a significant portion of the product. In such circumstances, traditional method may not be easily used for cost estimation since it may result some misleading outputs.

In such circumstances, using a single-volume cost motivation to assign indirect expenses to the cost object is not be a good idea for a detailed cost analysis in different conditions. Raw material usages are commonly used as a cost motivation in conventional costing and a single cost driver is generally implemented for the distribution of overheads. In addition, product expenses are fairly high when the accounting is performed with traditional expenditure accounting especially for the organizations where the proportion of overheads to total costs (Gunasekaranand & Sarhadi, 1998; Tsai & Kuo, 2004). On the other hand, the main idea behind ABC is to classify overheads or indirect costs and to assign them to products or services based on the required activities to produce these products (Raz & Elnathan, 1999).

In this paper, we intend to use ABC method for assessing the most important cost components involved IT based infrastructures. There are some universities introduced IT based educational systems in Iran such as Khajenasir University, Shiraz University and Science and Technology, Amir Kabir University and Iran University of Science and Technology. In this paper, we present an practical study to calculate the relative cost of IT based educational system based on ABC and traditional methods. Our study gathers the necessary information for a real-world case study of some governmental universities located in Tehran/Iran and analyzed them based on some statistical methods. The organization of this paper presents details of our implementation in the next section, the results of the study is given in the third section and the paper ends with some concluding remarks to summarize the contribution of the paper.

The Proposed Model

The basic idea of ABC is to consider cost objects including products, product lines, processes, customers, channels, markets, which makes it different from traditional cost accounting (TCA) (Tsai & Kuo, 2004).

The accuracy of ABC could be different since it may be implemented improperly but the focus must generally be on the product, customer or a combination of both. Resources include indirect expenses of the firms and they are assigned to the activity centers (Figure 1). Resource drivers are used during allocation of the resources to the activity centers (Baykasoglu & Kaplanoglu, 2008).

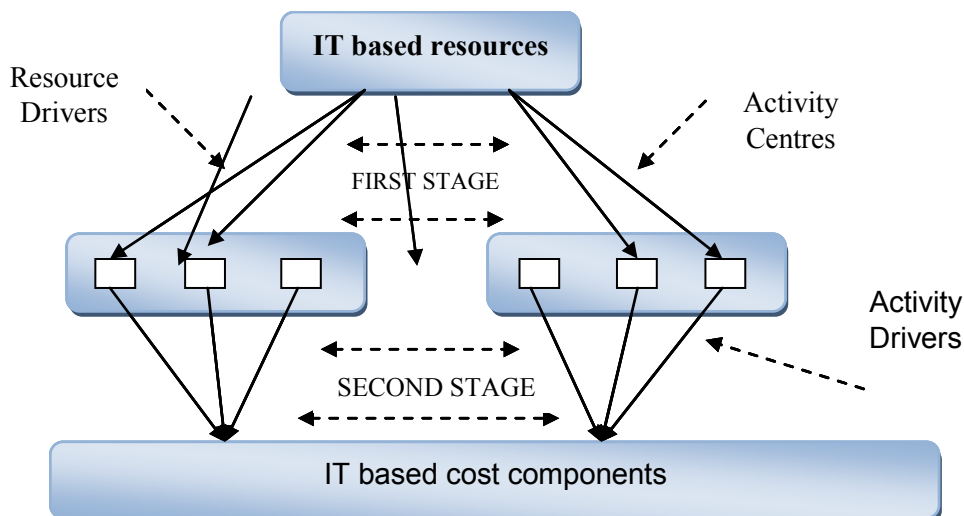


Figure 1. Cost assignment procedure in ABC (Tsai & Kuo, 2004)

The implementation of ABC method for IT based educational systems is a bit difficult since in this kind of organizations, it is more difficult to identify the cost of driving and its effectiveness for each activity. We need to first determine cost drivers and then allocate them based on a suitable method. We have used interview method to identify the driving cost and using the organizational chart of the universities and studying administrative structure of universities, all components, which serve to the electronic students directly or indirectly have been determined. In this paper, we use experts' feedbacks (DMs) to determine the optimal candidates for cost drivers. There are some challenges for our implementation since most e-learning departments in Iran operates as a subsidiary of bigger universities and some of the cost components are common between the e-learning unit and other units such as security, utility, administration, etc.

We have collected the necessary data from three universities of Science and Technology University Amirkabir University and University of Shahid Beheshti. These universities have some common characteristics. First, all of them accept students in the technical-engineering fields and most of them admit students in the field of master of business administration. Second, they are all governmental universities with similar structure. Third, all universities have, at least, two years of experiencing of having this kind of students.

There are two methods that universities accept students such as provisional or regular. Note that students usually enter public universities by taking part in national exams and students who enter through regular policy are nominated as regular students. There was another way of accepting students, where the universities separately chose students based on some interview. The students who enter the university must take some additional courses and they switch to regular program when they pass their first term courses, successfully. During the first term, these students are called provisional until they maintain minimum requirements. Therefore, it is clear that the expense of education for these students could be different from the other students.

ABC analysis normally needs three cost components of direct payment, direct materials and overhead costs.

Direct Materials

One of the most prominent parts of direct materials is involved with preparation of SCOs. These SCOs are essential because the entire IT based educational program depends on these SCOs. There are different standards for organizing a SCO and the payment relies on the quality of the final outputs but we can calculate the mean expenses of SCOs, statistically.

Direct Payment

Most instructors need to participate in IT based courses using internet equipments and the payments are made proportion to the time they spend on their courses. On the other hand, the payment per hour is various from one instructor to another because it depends on instructors' academic evaluation. Nevertheless, we may estimate the hourly payment based on gathering the information and the average number of hours, statistically.

Overhead Cost

The overhead is indeed the vital segment of the cost components of IT educational courses. It requires different items including software licensing, maintenance cost, advertisement, internet connection, utility, employee salary, depreciation, training, etc.

The Results

In our study, we gathered the necessary data from three IT based units located in Tehran/Iran. The study selected engineering programs with different cost items to analyze the cost of IT based education using ABC technique. The main question of this survey was to know the most influencing cost items influencing the cost of IT based educational programs. We have explained all the necessary issues and determined the expenses paid to instructors and employees as the direct payment. The band wide was considered as the first important direct material and the indirect costs considered in our survey include depreciation of software packages, hardware facilities, servers, buildings and SCOs. The expenses of the necessary facilities, hardware equipments and other overhead costs were also gathered in our survey. We have gathered the necessary data of ten semesters from 2005 to 2010. In order to choose the most influencing factors on the cost of IT based educational program, we have implemented an analysis on time series data using panel data gathered from three universities. Table 1 introduces the names of all ten variables in our analysis.

Table 1: Characterization of the cost drivers

Variable	Description	Variable	Description
x_1	Utilities	x_6	The payment for teachers and their assistants
x_2	Online equipments	x_7	Hardware equipments
x_3	Internet connection and network	x_8	Depreciation
x_4	Employee payment	x_9	Server equipments
x_5	Software & Licensing	x_{10}	Other overhead costs

We have executed statistical test using panel data with Eviews 7 statistical software package and Table 2 summarizes the results of our analysis.

Table 2: The results of our analysis

Variable	Coefficient	Std. Error	t-student	Prob.
C	479464.6	66023.95	7.331590	0.0001
x_1	7.710480	1.927554	4.183359	0.0036
x_2	1.199100	0.134427	9.442452	0.0000
x_4	1.128847	0.046336	25.25306	0.0000
x_5	2.482711	0.417509	5.785968	0.0003
x_6	0.718669	0.088646	8.128509	0.0000
x_7	1.116901	0.449835	2.165832	0.0360
x_{10}	1.969411	0.327909	6.143285	0.0002

The results of our regression analysis show statistical effects of seven variables. The results are meaningful when the level of significance is less than 0.01, which means, the cost of IT educational system depends on internet connection and network, utilities, employee payment, software & licensing, payments of instructors and their assistants, hardware equipments and other overhead expenditures.

Conclusions

In this paper, we have applied an empirical investigation to study the effects of different cost items on IT educational programs. The study gathered the necessary cost items of three governmental universities and it has chosen ten different cost items. We have found that seven cost items play important role on the cost of IT based educational system including utilities, internet connection and network, employee payment, software & licensing, payments of instructors and their assistants, hardware equipments and other overhead expenditures. This could help us determine the precise cost of IT based educational system using activity cost method.

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Biography



Prof. Sadjadi finished his PhD from University of Waterloo in 1998. His area of research is on optimal pricing. He is editor-in-chief of International Journal of Industrial Engineering Computations and Management Science Letters published by Growing Science, a Toronto based publishing company.