

Planning, Implementing and Cost Calculation for Enterprise Resources Planning Deployment (ERP Conceptual Model)

AFTAB ASLAM
University Institute of
Information Technology
AAUR (Arid Agriculture
University Rawalpindi)
aftabaslam86@gmail.com

MUHAMMAD SHABIR HASSAN
University Institute of
Information Technology
AAUR (Arid Agriculture
University Rawalpindi)
shabbir.hassan@uair.edu.pk

HAMEED ULLAH KHAN
University Institute of
Information Technology
AAUR (Arid Agriculture
University Rawalpindi)
afhameed@gmail.com

MUDASSIR MEHMOOD ALI
Department of Computer
Engineering
UET (University of Engineering
and Technology, Taxila)
mudassir.mehmud@gmail.com

YASIR HAFEEZ
University Institute of
Information Technology
AAUR (Arid Agriculture
University Rawalpindi)
yasir@uair.edu.pk

Abstract— There are many cost estimation models but none specifically devised for ERP project, and the empirical evidence is neither convincing nor adequate from a human user perspective. Software cost estimation is considered as one of the complex and time consuming challenge. Software application development companies are always looking forward for the design and development of the unified model which can be utilized for the software cost calculation. Still the research is in process and most of the software development companies have to rely on different models for their software cost estimation.

In this paper, we have presented conceptual model for cost estimation for enterprise resource planning projects. The conceptual model has been simulated on the real time case study. The proposed model in this paper is the extension of the Cocomo-II or in simple the Cocomo-II and its drivers can be consider as the base for the formulation of the conceptual model. The model has the capacity to perform multi cost calculation to provide more efficient and effective results. The paper concludes by providing a framework of the key issues involved in the Risk and Feasibility for the Planning, Implementing and Cost Calculation for ERP Deployment.

Keywords—Prediction Systems, User Perspective, Software Application, Cost Estimation, Rnterprise Resource Planning (ERP)

I. INTRODUCTION

Information technology plays an important role in the development of the business [1]. The implementation of the information technology is expensive but it have been seen in the past years that the success rate of these implementations are high and they provide a great benefit to the organization and also in the promotion of the business [2]. Before the implementation of any information system in an organization, we have to ensure that the information system strategy (IIS) and cost calculation is performed according to the requirement, business functionality and specification of the organization [3]. It has been analysed from number of different researcher and practical experience that the cost estimation of the ERP is one of the main issues and most of the project fails due to the wrong selection of cost methodology [4].

The emergence of software technology in a large number of software applications are being developed, designed and implemented for performing business automation and different tasks [5]. Most of these applications are developed and implemented by number of software development companies [6]. The software products have made the human life easy and

have automated a large number of tasks, activities and operations. However, still a large demand of the customized and ‘out of box’ [OOB] solutions are increasing day by day as the many organizations are integrating their business and operational environment with information technology products. Many software applications have being designed, developed and implemented especially, for the monitoring of the real time critical environment [7]. The development of the system application is deliberated as the most difficult task as it faces number of challenges during the process of the design and implementation, though the process involves different parameters [2].

The design and implementation of the key turn software solution requires a software methodology. There are number of software methodologies which have been presented and simulated by different software development companies. The methodologies are based on different techniques and frameworks [8]. These software methodologies help in the overall planning, management and managing different processes which are involved in different phases of requirement gathering, testing, deployment and many other phases [9]. Most of the software and application development companies are using different type of methodologies so, that they can provide and manage software solution appropriately. The research has been conducted to identify and analyse the Cost Calculation for ERP Deployment.

The paper structure is as followed:

In the next section, the proposed solution for the Conceptual cost estimation model has been presented. In the section III the calculation for the Quantify Project Approval Factors has been performed. In section VI the Risk and Feasibility Analysis for the implementation of the ERP solution has been discussed. This is followed by the conclusion.

II. CONCEPTUAL COST ESTIMATION MODEL

In the proposed solution the Conceptual Cost Estimation Model based on the COCOMO-II has been developed. In the conceptual model the Multi-Comparison Approach has been integrated to identify and compared the existing result of the Cost Estimation with the new results. The purpose of most multiple-comparisons procedures is to control the “overall significance level” for some set of inferences performed as a follow-up to ANOVA. This “overall significance level” or error rate is the probability, conditional on all the null

hypotheses being tested being true, of rejecting at least one of them, or equivalently, of having at least one confidence interval not include the true value [10] [11]. There are two stages on which the cost estimation will be conducted. In the first stage of the cost estimation the COCOMO-II will be utilized and in the second stage of the cost estimation the results will be compared with previous results. Every time the model executed the results are stored in the log history. The estimation results will be stored in the Logs and once the comparison is completed the final cost Estimation of the project will be presented. The solution has been executed for calculation of the quantify project approval factor.

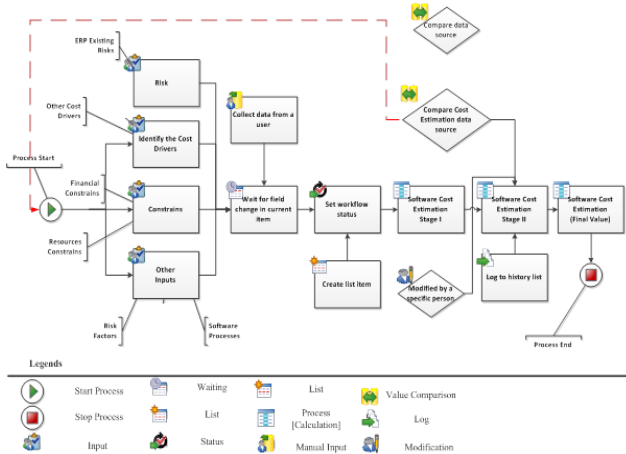


Fig. 1 Conceptual Model

III. QUANTIFY PROJECT APPROVAL FACTORS

There are certain Quantify Project Approval Factors which play an important role in approving the project. In the initial phase of the document the high level view of the proposed solution will be identify and in the second phase the impact and scope of the project is identified. The implementation of the information system to required a certain amount of budget.

A. Project Breakdown

The estimated Project Breakdown has been presented in this section. The proposed solution has been categories into different section. The functional requirement, Iteration and estimation time which will be required to complete these sub system has also been mentioned in the Project Breakdown structure. The project will be completed in the duration of 41 weeks.

Tasks ID	Description	Functional Requirements	Iteration Requirement	Estimated Time
101	Document Automation Sub-System	8	2	18 Weeks
102	Internet Web Portal Sub-System	2	1	8 Weeks
103	Business Intelligent Reporting Module	1	3	4 Weeks
104	Workflow and Integration with Document Management System (DMS)	1 (Total we need 12 Module) 1 * 12 = 12	8	3 Weeks
105	Stress and Other testing Tools	3	2	1 Weeks

106	Deployment of Database and Application Servers	2	1	2 Weeks
107	Software Application Development Time			36 Weeks
108	Software Quality Issuance and Testing			5 Weeks
Total Project Time of Office Automation				41 Weeks

Table 1 Project Breakdown

B. Development Cost

The estimation development cost of the project has been calculated, during the Development Cost planning it have been kept in mind that the project cost should not reach above \$ 50,000. The following table presents the Development Cost

Expense Category	Amount
Infrastructure Deployment and Hardware Cost	\$ 15,000.00
Network Deployment and Hardware Cost	\$ 5,000.00
Training and Planning troubleshooting	\$ 10,000.00
Office Automation Application Development	\$ 20,000.00
Total	\$ 50,000.00

Table 2 Expense Category

C. Annual Operating Costs

Annual Operating Costs for the execution of the project has been calculated. It can be analysed from the existing literature [5] [12] that with the passage of time the IT solution required less Annual Operating Costs. However, in the initial phases due to the solution and hardware deployment these solutions required more cost. In the initial year the Annual Operating Costs is around \$15,000.00

Expense Category	Amount
Application and Database Hosting	\$3,500.00
Security Support	\$3,000.00
Application Updates	\$3,800.00
Online Application Support (Third Party)	\$2,200.00
Repairing and Upgrading	\$2,500.00
Total Annual Operating Costs	\$15,000.00

Table 3 Expense Category

D. Cost benefits Analysis

There are two main processes which are conducted in the Cost benefits Analysis. In the first section, we have analyzed anticipated benefits that will be extracted from the implement of the proposed solution and in the second phase the estimated annual benefits are calculated.

1) Anticipated benefits (Intangible and Tangible)

a) Intangible benefits

The overall client satisfaction will be increase by the deployment of the proposed solution. The proposed solution will also be increasing the efficiency and decision making capacity as the data will be available to all the decision making or stakeholder interlinked with organisation. The positive reputation of the company will also be developed as the customer quires will be entrained more quickly and efficiently.

Benefits or Cost Saving	Amount
Service Downtime will be decreased	\$15,000.00
Automation of Processes	\$30,000.00
Staff and task efficiency	\$50,000.00
Reduced Services, Courier and Other Costs	\$5,000.00
Total	\$100,000.00

Table 4 Benefits or Cost Saving

2) NPV Benefits

The NPV Benefits has been calculated for the time span of next five years. In can be analyse from the calculation that organisation can pay back the loan within the time span of five years. The year 0 has also been considered during the analysis.

Categories	Year 0	Year 1	Year 2	Year 3	Year 4
Value of Benefits		\$100,000.00	\$110,000.00	\$120,000.00	\$130,000.00
Development Cost	\$50,000.00				
Annual Expenses		\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00
Net benefits/Cost	\$50,000.00	\$85,000.00	\$95,000.00	\$105,000.00	\$115,000.00
Discount Factors	1.0000	0.9434	0.8900	0.8390	0.7921
Net Present Value	\$50,000.00	\$80,189.00	\$84,550.00	\$88,095.00	\$91,091.50
Cumulative NPV	\$50,000.00	\$85,000.00	\$95,000.00	\$105,000.00	\$115,000.00
Payback Period					

Table 5 NPV Benefits

IV. RISK AND FEASIBILITY ANALYSIS

It has been analyzed from the existing research that deployment of the information system is associated with number of different risk. These risks have been associated with number of different categories including “organizational risks, technological risks, Assess resource risks and many others. In this section we have covered and discussed the following risk with the perspective of Office Automation.

1. Organizational risks
2. Technological risks
3. Assess resource risks
4. Schedule risks

A. Organisational Risks and Feasibility

Adaptation of the information technology is depended upon number of different parameters [13]. Most of the organisation has different cultures and these culture play an important role in the overall adaptation of the information system (IS) at organisation [14]. As the resources are comfortable in working with traditional environment so there is a possibility that organizational risks occur.

The change in environment working mechanism will overall effect and may identify that resource about their loss of control. However, the risk can be minimized if the training

sessions are conducted by the help of the project manager or other team leads integrated in the project.

B. Technological Risks and Feasibility

The new technology will be introduced in the workspace of organisation as the project need to the executed by the user end of these devices. The Technological Risks may be raised as the staff's working at organisation is not familiar with the new computing devices. The best ways to address this risk is to integrate the training session and focus that what benefits can be extracted by the integrated of these devices and proposed solution.

The project manager must set up the initial session on focusing the how efficient these devices are and within how much time can be saved by the utilization of these devices. The psychological view about the integration of the proposed solution must be set positive in the mind of the resources.

C. Resource Risks and Feasibility

Project required number of technical and management resources to design and develop the proposed solution. Currently the organizations don't have the technical capacity to handle the risk or design the required solution. So the company will be outsourcing the project so that they can develop the office automation environment. There is a high probability that the Resource Risks may occurred.

It is high recommended that organisation must hire the technical experience manager who can manage and evaluate the plan and working strategies of all the third party resources which has been hired for the development of the office automation. The infrastructure will be required for the execution of the hardware. The tendering process will be expected for the infrastructure. The resources risk can only be minimized by the manger and planning of project manager.

D. Schedule Risks and Feasibility

Most of the information technology projects are dependent upon number of task and activities. The activities are dependent upon the other activities. If delay in the activity is caused there is a high probability that the overall simulation of the project will be disturbed. In most of the case it has been analyzed that the Schedule Risks has occurred. During the Office Automation for organisation there are numbers of outsources resources so there is a high possibility that the Schedule risk may occur.

It is recommended that the project plan must be updated on the weekly basic and the information must be shared with the resources engaged in the development of the solution. The alert must be generated to the outsourced company so that they can deliver the module on the specific timeframe.

V. CONCLUSION

The main contribution of the paper is to design and develop a conceptual cost estimation model. The verification and validation of the conceptual cost estimation model has been conducted in the real time organization. It has been analyzed based on the simulation results that the proposed solution is more efficient and effective as compared to the existing cost estimation model designed for ERP.

References

- [1] Salman Azhar, "Building information modeling (BIM): Trends, benefits, risks, and challenges for the AEC industry," *Leadership and Management in Engineering*, vol. 11, no. 3, pp. 241-252, 2011.
- [2] Kathy Schwalbe, *Information technology project management.*: Cengage Learning, 2013.
- [3] Antonio Gonzalez and Rob Knight, "Advancing analytical algorithms and pipelines for billions of microbial sequences," *Current opinion in biotechnology*, vol. 23, no. 1, pp. 64-71, 2012.
- [4] Gila Molcho, Asher Cristal, and Moshe Shpitalni, "Part cost estimation at early design phase," *CIRP Annals-Manufacturing Technology*, vol. 63, no. 1, pp. 153-156, 2014.
- [5] Srikant M Datar, Madhav V Rajan, Monte Wynder, William Maguire, and Rebecca Tan, *Cost accounting: a managerial emphasis.*: Pearson Higher Education AU, 2013.
- [6] Mahadevan Supramaniam, Azween Abdullah, and Ramachandran Ponnann, "Cost Analysis on ERP System Implementation amongst Malaysian SMEs," *International Journal of Trade, Economics and Finance*, vol. 5, no. 1, pp. 72-76, 2013.
- [7] Wilson Rosa, "Empirical effort and schedule estimation for enterprise resource planning projects," in *Software Measurement and the 2012 Seventh International Conference on Software Process and Product Measurement (IWSM-MENSURA)*, 2012 Joint Conference of the 22nd International Workshop on, 2012, pp. 190-197.
- [8] Moutaz Haddara and Ahmed Elragal, "ERP adoption cost factors identification and classification: a study in SMEs," *International Journal of Information Systems and Project Management (IJISPM)*, vol. 1, no. 2, pp. 5-21, 2013.
- [9] Narges Sajadfar, Luis Campos Triana, and Yongsheng Ma, "Interdisciplinary Semantic Interactions within a Unified Feature Model for Product Cost Estimation," 2014.
- [10] Yosef Hochberg and Ajit C. Tamhane., "Multiple comparison procedures.," John Wiley & Sons, Inc., 1987.
- [11] John A. Rafter, Martha L. Abell, and James P. Braselton, "Multiple comparison methods for means.," *Siam Review*, vol. 44, no. 2 , pp. 259-278, 2002.
- [12] Patricia Karen A Abanilla et al., "Cardiovascular disease prevention in Ghana: feasibility of a faith-based organizational approach," *Bulletin of the World Health Organization*, vol. 89, no. 9, pp. 648-656, 2011.
- [13] Peter Edwards, Barrister Doughty Street Chambers Paul Bowen, and Paul Bowen, *Risk management in project organisations.*: Routledge, 2013.
- [14] Markus Volter, Thomas Stahl, Jorn Bettin, Arno Haase, and Simon Helsen, *Model-driven software development: technology, engineering, management.*: John Wiley & Sons, 2013.
- [15] Moutaz Haddara, "Exploring ERP Adoption Cost Factors," *Journal of Computer Technology \& Applications (JCTA)*, vol. 3, no. 3, pp. 250-261, 2012.
- [16] Wilson Rosa, Travis Packard, Abishek Krupanand, James W Bilbro, and Max M Hodal, "COTS integration and estimation for ERP," *Journal of Systems and Software*, vol. 86, no. 2, pp. 538-550, 2013.
- [17] Mohamed T Kotb, Moutaz Haddara, and Yehia T Kotb, "Back-propagation artificial neural network for ERP adoption cost estimation," in *Enterprise information systems.*: Springer, 2011, pp. 180-187.
- [18] Narges Sajadfar and Yongsheng Ma, "A hybrid cost estimation framework based on feature-oriented data mining approach," *Advanced Engineering Informatics*, 2015.