

# ERP Implementation Framework: The Case of Ethiopia

Alemu Samuel

United System Integrators, Addis  
Ababa, Ethiopia  
alexsmulatu@gmail.com

Mesfin Belachew

Ministry of Communication and  
IT, Addis Ababa, Ethiopia  
mesfinbelachew@gmail.com

Mesfin Kifle

Department of Computer Science,  
Addis Ababa University, Ethiopia  
kiflemestir95@gmail.com

---

## Abstract

Over the past decade, Enterprise Resource Planning (ERP) systems have become one of the most important developments in the corporate use of information technology. ERP implementations are usually large, complex projects, involving large groups of people and other resources, working together under considerable time pressure and facing many unforeseen developments. In order for an organization to compete in this rapidly expanding and integrated marketplace, ERP systems must be employed to ensure access to an efficient, effective, and highly reliable information infrastructure. They have almost become the de-facto option for replacing legacy systems. Despite the benefits that can be achieved from a successful ERP system implementation, there is evidence of high failure in ERP implementation projects. There is evidence that the overwhelming majority of ERP implementations exceed their budget and their time allocations. Researchers have begun to analyze ERP implementation in case studies in order to provide an implementation framework which maximizes efficiencies.

Identifying the Critical Success Factors (CSF) as early as possible can provide valuable clues to help project managers improve their chances of success. This research focuses on seeking the most important CSF that influence the implementation process of an ERP system in Ethiopia.

An implementation framework is designed so that the research questions can be studied systematically. Based on a literature review and a survey study on five organizations, a list of 17 CSFs are identified as important in ERP system implementation in Ethiopia. Based on the survey result an interview guide is prepared for three case organizations. The interview result shows that all the 17 CSFs have significant influence on ERP implementation. However, a significant variation is seen on the degree of importance in state organizations and the private sector on some of the factors.

*Keywords:* Critical Success Factors; ERP Implementation Framework

---

## 1. Introduction

Nowadays Information Technology has become an important part of our daily activity. IT and Information Systems changed the business atmosphere. Production and services grew, quality is improved, and at the same time competition between companies is increased. In this competitive situation, organizations can survive only if they improve quality, decrease costs in their whole supply chain, reduce inventories, diversify their products and services, and provide more reliable delivery service in better ways in comparison to their competitors.

ERP systems have the ability to automate and integrate business processes, share data and practices across the organization, and produce and access real-time information. A successful ERP can be the

backbone of business intelligence for an organization, giving management a unified view of its processes [1].

With the objectives of improved business productivity, streamlined business operations, and increased cost savings, organizations worldwide have launched initiatives to integrate ERP systems into their existing business environments. There has been a growing increase in using ERP systems as a business information system platform for large organizations and government corporations [2].

Due to the capabilities of large ERP system and the essential solutions expected from this system to support the enterprise, its implementation process is complex and risky. It engages a considerable amount of enterprise resources, which are put at risk during

implementation. The managers do not have clear and useful method to direct, effectively and efficiently, the process of implementing an ERP system. They have no guarantee that the system will likely provide the expected benefits [3]. Therefore it is very essential to identify the critical success factors in implementing ERP systems in an enterprise.

## 2. The Proposed Solution

In order to research into the critical success factors for an ERP implementation and to have a guidance framework to conduct an examination and capture research data, a theoretical framework has been developed to aid the research process. A theoretical framework offers the possibility to group complex issues of investigation together in a more manageable research overview for the researcher [14].

### 2.1 The Proposed Framework

The proposed framework is based on the existing literature on information systems success, implementation of information systems and ERP

systems and previous studies conducted on ERP critical success factors.

The proposed ERP Implementation Success Framework shown in Figure 1 is represented by five broad categories: National context, Organizational context, ERP system context, External Expertise context, and ERP success.

### 2.2 National Context

National culture influences the way IT is perceived or used. Several authors found proof of this in their studies. All of these studies show a certain impact of national culture in the perception and use of IT [14]. Huang and Palvia [11] identified national factors as: current economic status and economic growth, infrastructure, and government regulations fundamentally impact on IT adoption and ERP penetration. In infrastructures such as transportation, telecommunications, Internet and intranet, mobile telecommunications, and public database systems, developing countries obviously have a poor record and suffer from the consequences [11].

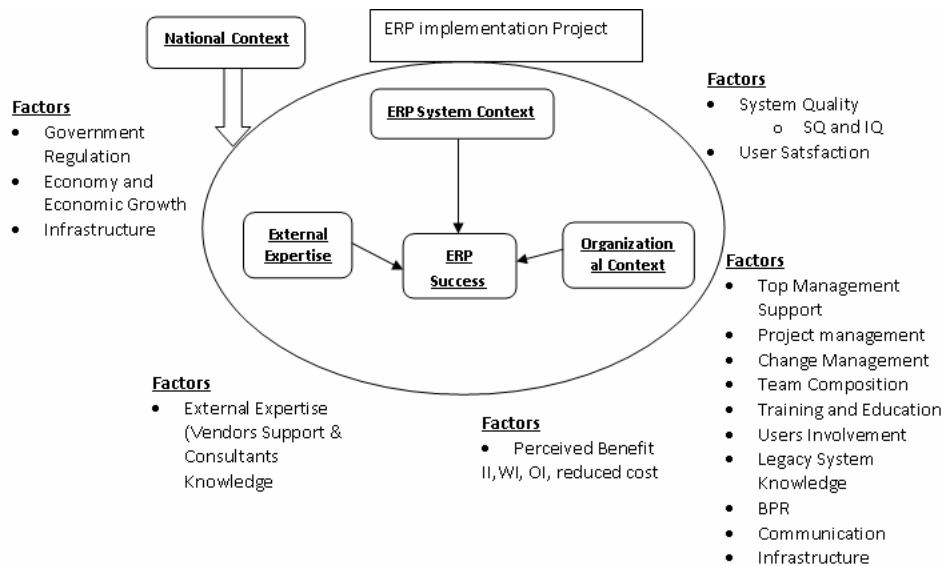


Figure 1: The Proposed ERP Implementation Success Framework

In another study, Abdelghaffar *et al.* [12] like Huang and Palvia [11] identified the national factors which consist of the factors that affect implementing ERP in the country from the macro level. Huang and Palvia [11] argue that the implementation of ERP systems in China - as a developing country - is affected by both national and organizational factors.

In the proposed framework under the national context, the following three factors are included: the level of economy and economic growth, the status of infrastructure like telecommunication, Internet, mobile telephone, and government regulation towards promoting ICT in the country.

### 2.3 Organizational Context

ERP implementation influences an organization in a number of ways and these changes will be questioned in order to derive CSFs for ERP implementation projects.

From an organizational and internal perspective, Huang and Palvia [11] identified low IT maturity, small firm size, and lack of process management and BPR experience as hampering factors for ERP adoption and they also argue that firms also lack process management orientation and BPR experience. Unlike past computer systems, ERP systems are off-the-shelf and impose their own logic on the company, often forcing companies to change the way they do business. While promising, the actual experience of using IT to redesign business processes is limited in developing countries.

Esteves and Pastor [13] also identified sustained management support, change management, project management, BPR, Project team, and user involvement as strategic factors and consultants' quality, communication, training, and trouble shooting as tactical factors that will affect the implementation of ERP at organization level.

In the proposed framework, the following factors will be included from the organizational context: Sustained Management Support, Change Management, Project Management, Business Process Reengineering (BPR), User Involvement, Communication, Legacy systems, Training and Education, Team Composition, and Infrastructure.

### 2.4 ERP System Context

An ERP, by nature, is a one-system-only information system that models all the business processes in one, the management of this is seen to be crucial for the success of the organization.

The first factor in the system context is the ERP System Quality (SQ). This factor was identified as critical by many researchers [6, 15, 16, 17]. The questions that this factor will address concerning system quality will be: the functionality of the system, completeness of information, ease of understanding, relevance of the information and how the users' perceive it, and security issue of the ERP system.

The second factor in the system context will be ERP Information Quality (IQ), DeLone and McLean [5] found that researchers had focused on the system's ability to produce the desired information. The ERP information quality concerns the actual information produced by the ERP system.

An ERP system's main selling point is its ability to streamline the information flow in the organization, thus this should be investigated.

The questions that this factor will address concerning information quality will be: the adaptability of the system, its availability to the users, the reliability of the output of the system, and its usability.

### 2.5 External Expertise Context

When the ERP vendor/consultant provides adequate technical support, has a good relationship with the adopting firm, and so forth, the transfer of relevant information and knowledge to the client is enhanced [8, 15]. It can be argued that the client will be in a better position to use the acquired software efficiently and effectively in achieving organizational goals when such an arrangement exists [15].

Therefore Consultants' Quality in the implementation and in transferring knowledge to employees of the organization and the unreserved Vendor Support provided for the organization will be the two important factors in this context.

### 2.6 ERP Success Context

Perceived benefits are the most important success measures as they capture the balance of positive and negative impacts of the system in the organization and its customers.

According to Chien and Tsaur [16], the primary benefits expected to result from ERP are closely related to the level of integration that is promoted across functions in an enterprise. Expectations for improved business performance after adoption may result from both operational and strategic benefits [16].

Therefore, Perceived Benefit is the major factor in this context and it will be measured by Individual Impact (II), Work Group Impact (WI), and Organizational Impact (OI).

### 3. Data Presentation and Analysis

The survey was conducted on managers, consultants, supervisors, IT professionals, key users, and end users from five different organizations which have implemented ERP and or are in the final process of implementing one. A total of 40 questionnaires are distributed. Two of them are sent

and returned by e-mail and another two discarded due to dishonesty. As shown in Table 1, survey participants were from construction, communication, government, technology, cement, and manufacturing firms. From the total of 40 questionnaires, 30 were returned and 28 were valid. That means about 70% of the questionnaires sent were received and used for the analysis.

Table 1: Demographic data of Respondents

Company	Type	Industry	Questionnaire Delivered	Questionnaire Collected	Valid	%
Sunshine	Private	Construction	8	6	6	75
ethio telecom	Public	Communication	10	8	8	80
MoFED	Government	Government	10	8	7	70
TCT	Private	Technology	8	6	5	62.5
Mesobo	Private	Cement	2	2	2	100
MIE	Private	Manufacturing	2	0	-	
<i>Total</i>			<i>40</i>	<i>30</i>	<i>28</i>	<i>70</i>

#### 3.1 Critical Success Factors Identified

The survey result in Table 2 summarizes the 14 CSF identified for implementing ERP in Ethiopia. These factors were ranked according to their importance valued by their mean value. All the

factors have a mean value greater than 3.5 indicating that all the 14 factors are significantly important for implementing ERP in Ethiopia.

Table 2: CSF by their degree of importance

Rank	CSF	N	Mean	Std. Deviation
1	Perceived Benefit	28	4.45	0.52
2	Training and Education	28	4.15	0.77
3	User Involvement	28	4.14	0.80
4	BPR	28	4.05	0.54
5	User Satisfaction	28	4.04	0.82
6	Team Composition	28	4.02	0.76
7	System Quality	28	4.02	0.70
8	Communication	28	3.94	0.81
9	Infrastructure	28	3.93	0.77
10	Change Management	28	3.90	0.71
11	Legacy System	28	3.85	0.48
12	Top Management	28	3.82	0.95
13	External expertise	28	3.79	0.96
14	Project Management	28	3.70	0.64

### 3.2 Reliability of the Survey Instrument

The reliability is measured in cronbach’s alpha coefficient method. The croanbatch alpha result for the whole survey (14 items) result shows 0.924.

### 3.3 Within Case Analysis and Interpretation of Findings

#### a. Organizational Context

Factors in this context include: Team Composition, Infrastructure, Training and Education, User Involvement, BPR, Top Management Commitment, Change Management, Communication, Legacy System and Project Management. Except Legacy System, Top Management Support and Project management factors in this context are ranked in the top ten CSF for ERP system implementation in Ethiopia. Training and Education, User involvement, and BPR ranked from 2nd to 4th with mean values of 4.15, 4.15, and 4.05 respectively and the other CSF, Team Composition, ranked 6th with a mean value of 4.02. However Change Management, Top Management, and Project Management were ranked 10th, 12th and 14th with mean values of 3.90, 3.82, and 3.70 respectively.

#### b. ERP System Context

System Quality and User Satisfaction are the two main CSF identified for ERP system implementation in Ethiopia. System Quality ranked 7th with a mean value of 4.02 and User Satisfaction ranked 5th with a mean value of 4.04.

#### c. External Expertise Context

Factors in this context were vendor support and consultant quality. These two are external expertise that are identified as CSF for ERP implementation. This two factors are merged into one and ranked 13th with a mean value of 3.79.

#### d. ERP Success Context

Perceived Benefit in terms of performance improvement, cost reduction, and time saving is the most CSF in Ethiopia. With a mean value of 4.45, it ranked the 1st CSF in ERP system implementation in Ethiopia.

### 3.4 Cross Case Analysis and Interpretation of Findings

This Section draws comparison from the case study organizations with the aim of identifying similarities and differences in CSF identified in ERP system implementation. The analysis was based on the framework designed in section 3. Figure 2 shows the relative importance of CSFs in the study case organizations. Perceived Benefit in terms of performance improvement operating cost reduction, and time saving is the most significant factor in all the three case organizations and the other CSFs that rate relatively similarly (equal rank) are user involvement, change management, communication, and project management. However, high variance is seen in top management and team compositions.

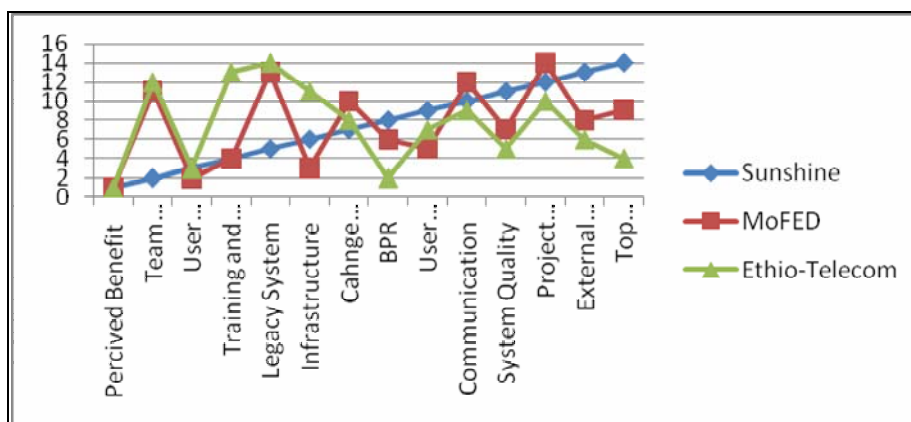


Figure 2: Rank of CSF by case organization

When comparing the similarity and variation of CSF in the two case organizations, MoFED and ethio

telecom, most of the CSFs are not as dispersed as when comparing Sunshine with one of the other two.

One thing these companies share is the ownership of the companies, i.e., MoFED is a government organ and ethio telecom is a government owned company. The two companies ranked government commitment and support higher than Sunshine Construction Company which is a private owned company. Another similarity between state owned companies is seen in team composition. These two companies established a separate project office for ERP implementation while Sunshine has not established a separate project office for its ERP project.

Yet another interesting result was seen in legacy system. Both ethio telecom and MoFED have many legacy systems they have been using and expected to be replaced by the new system and other systems that need interfacing to the new system, ranked legacy system knowledge below 10th while Sunshine, without any centralized legacy system that will be abandoned and no interfacing to any other system, ranked legacy system knowledge in the 5th position.

The other finding is Training and Education. Sunshine and MoFED ranked training and education on 4th position while ethio telecom ranked it 13th. Here again ethio telecom is highly experienced in implementing technology related systems that need intensive trainings, and this experience differentiates it from the other two companies. When we see the degree of importance of BPR, ethio telecom ranked it on 2nd most important and MoFED ranked it on 6th and Sunshine on 8th place. The case organizations have made different levels of structural changes in organizations before the implementation and or during the implementation. ethio telecom made total

organizational restructuring, MoFED made BPR as part of performance improvement plan of the government while Sunshine made a small process changes during the implementation.

#### 4. Related Work

ERP software packages provide enterprise-wide generic solutions to many organizations. An enterprise system imposes its own logic on a company's strategy, culture, and organization [4].

Rajapakse and Seddon [7] showed that fewer than 7% of ERP implementations worldwide have been in developing countries (in Asia where they have done their studies). Organizations in the developing-country context pursue ERP systems for similar reasons to organizations in the developed countries: mainly to support their growth beyond what their previous in-house developed systems allowed, and to stay competitive (and link strategically) with other organizations globally [11, 12].

In their study, Abdelghaffar *et al.* [12] claim adopting ERP in developing countries is faced by several obstacles compared with developed countries. The challenges faced by developing countries vary on organizational level and cultural factors and lack of knowledge of ERP systems

Abdelghaffar *et al.* [12] studied significant factors influencing ERP implementation in large organizations in Egypt. They have adopted Huang and Palvia's framework to assess which factors have more significant impact on the success of ERP implementation in Egypt and they come up with their own modified framework as shown in Figure 3 [12].

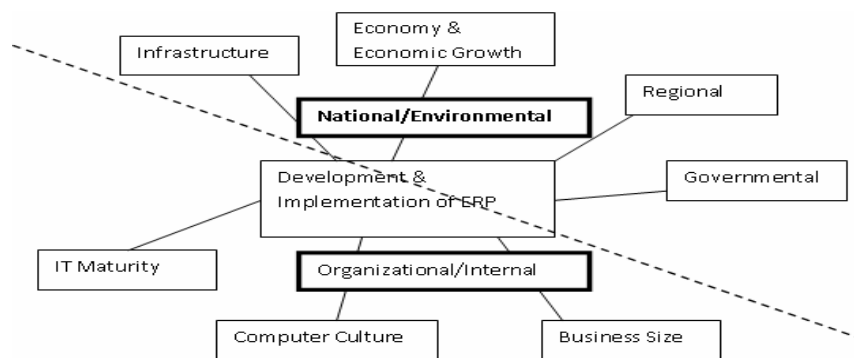


Figure 3: ERP Implementation Framework

They have identified 7 CSF for implementing ERP in large organizations in Egypt. Under the

National/Environmental factors: Infrastructure, Economy and Economic Growth, and Regional and

Governmental factors are more significant and under the organizational or internal factors they have identified IT maturity, Business size, and Computer Culture.

Due to low success rate of ERP system implementation in China, Zhang *et al.* [17] developed an ERP implementation success framework by adapting the DeLone and McLean's [5] IS success model to identify both CSFs and success measures (Figure 4). From the research

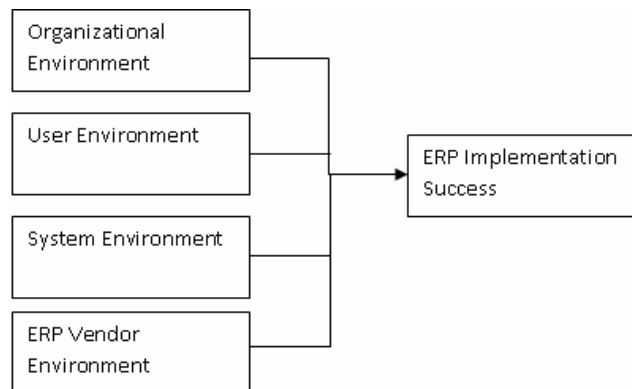


Figure 4: ERP implementation success framework

Yihe Zi [18] explored the differences in CSFs for ERP system implementation stages in China and Finland as a representative of the western countries. Previous research on the subject matter was thoroughly explored to form a solid basis for the empirical study. Yihe Zi used Shanks *et al.*'s [10] synthesized ERP project lifecycle as an ERP implementation process model to show which factor is more important at each of the implementation stages.

The major CSFs identified as important are: Top management support, ERP teamwork and composition, Project management, Clear goals and objectives, Change management, User training and education, Business Process Reengineering and minimal customization, Presence of a champion, Use of experts and consultants, Interdepartmental communication and cooperation, Master data quality, and Performance measure.

In their Comparative Study of Critical Success Factors (CSFs) in Implementation of ERP in developed and developing countries, Moohebat *et al.* [9] studied 52 researches identified as a

framework, they have identified 12 CSFs: Top Management Support, Company-wide Support, Business Process Reengineering, Effective Project Management, Organizational Culture, Education and Training, User Involvement, User Characteristics, ERP Software Quality, Information Quality, System Quality and the success measures were User Satisfaction, Individual Impact, Organizational Impact, and Intended Business Performance Improvement.

representative of developed countries and 33 as developing countries. Among these researches, 14 developed and 16 different developing countries are identified. USA with 25 and China with 11 researches had most resources in this study, respectively between developed and developing nations.

According to Moohebat *et al.* [9], differences exist between ERP critical success factors in developed and developing countries as shown in Table 3 [9]. Few factors like "ERP vendor" and "National culture" seem more important for developing countries and some factors like "Business process reengineering" and "Fit between ERP and business/process" differs among developed and developing countries.

Table 3: CSF in Developed and Developing Countries

<i>Critical Success Factors</i>	<i>Developed Countries</i>	<i>Developing Countries</i>
Appropriate business and IT legacy systems	6	6
Business plan/vision/goals/justification	13	14
Business Process Reengineering	31	19
Change management	35	30
Communication	20	19
Country-related functional requirements	3	3
Data accuracy	9	8
ERP project team	31	24
ERP strategy and Implementation	24	17
ERP Vendor	8	13
Fit between ERP and business/process	9	1
Monitoring and evaluation of performance	9	7
National culture	4	10
Organizational characteristics	7	6
Project champion	13	6
Project management	31	26
Software Development, testing, and troubleshooting	13	6
Top management support	28	29

The framework in [12] has not recognized the impact of external expertise on ERP implementation in countries where ERP implementation is new and all the expertise on the field will be from outside the organization and the ability to transfer knowledge is essential to the success of ERP in the companies. Whereas Zhang *et al.*'s framework doesn't consider the national context in which the implementation is done. It is evident from other researches such as in [12] implementation in developing countries is highly affected by the national factors. Moohebat *et al.* studied CSF for ERP implementation in developed and developing countries by studying from thorough literature review and Yihe Zi studied the CSF in china against Finland. These studies will be used as a basis for this study.

## 5. Conclusion

The implementation of ERP systems in organizations is an enormously complex undertaking. It is a high-risk project that needs to be managed and planned properly because it can affect nearly every

aspect of organizational performance and functioning.

Many organizations do not achieve success in their ERP implementation projects. The aim of this research was to explore CSF for ERP implementation in Ethiopia and how they affect the organizations. This study is valuable to researchers and practitioners interested in implementing ERP systems in Ethiopia. It provides interesting results by identifying the factors that actually have an impact on the successful implementation of ERP and how it affects organizations. Implementing managers can use the result of this study as input for planning ERP system projects.

To ensure successful implementation, organizations must learn how to identify the critical issues that affect the implementation process and know how to address them effectively to ensure that the promised benefits can be realized and potential failures can be avoided.



## References

- [1] Janice Yick, "Implementing Vanilla ERP Systems: Factors to Consider in Strategy, Business Alignment, and Customization", University of Oregon Applied Information Management Program, 2011.
- [2] Jim Odhiambo Otieno, "Enterprise Resource Planning Systems Implementation and Upgrade: A Kenyan Study", School of Engineering and Information Sciences, Middlesex University, 2010.
- [3] Noe Garcia Sanchez, Luis E, and Perez-Bernal, "Determination of Critical Success Factors in Implementing an ERP System: A Field Studying Mexican Enterprise", *Journal of Information Technology for Development*, 2007.
- [4] Davenport, T. H., "Putting the Enterprise into the Enterprise System", *Harvard Business Review*, July-August, 1998.
- [5] Delone, W. H. and Mclean, E. R., "Information Systems Success: The Quest for the Dependent Variable", *Information Systems Research*, Vol. 3, No. 1, 1992.
- [6] Rockart, J. F., "Chief Executives Define their own Data Needs", *Harvard Business Review*, 1979.
- [7] Rajapakse, J. & Seddon, P., "ERP Adoption in Developing Countries in Asia: A Cultural Misfit", 28th Information Systems Seminar in Scandinavia, 6-9 August, KIRSTIANSAND, Norway, 2005.
- [8] Markus, M. L. and Tanis, C., "The Enterprise Systems Experience - From Adoption to Success, Framing the Domains of IT Research: Glimpsing the Future Through the Past", Ed. Zmud, R. W., Pinnaflex Educational Resources, Inc, Cincinnati, 2000.
- [9] Mohammad Reza Moohebat, Asefeh Asemi, and Mohammad Davarpanah Jazi, "A Comparative Study of Critical Success Factors (CSFs) in Implementation of ERP in Developed and Developing Countries", *International Journal of Advancements in Computing Technology* Vol. 2, No. 5, December 2010.
- [10] Shanks, G., Parr, A., Hu, B., Corbitt, B., Thanasankit, T., and Seddon, P., "Differences in Critical Success Factors in ERP Systems Implementation in Australia and China: A Cultural Analysis, Proceeding of European Conference on Information Systems", Vienna, July 2000.
- [11] Huang, Z., & Palvia, P., "ERP Implementation Issues in Advanced and Developing Countries", *Business Process Management Journal*, Vol. 7, No.3, 2001.
- [12] Hany Abdelghaffar, Reem Hamdy, and Abdel Azim, "Significant Factors Influencing ERP Implementation in Large Organizations: Evidence From Egypt, European, Mediterranean, and Middle Eastern Conference on Information Systems, Abu Dhabi, UAE, April, 2010.
- [13] Esteves, J. and Pastor, J., "Enterprise Resource Planning Systems Research: An Annotated Bibliography", *Communications of the Association for Information Systems*, Vol. 7, No. 8, August, 2001.
- [14] J. Gilbert Silvius, "The Impact of National Cultures on Business & IT Alignment", *Communications of the IIMA*, Vol. 8, Issue 2, 2008.
- [15] Princely Ifinedo, "Enterprise Systems Success Measurement Model: A Preliminary Study", *Journal of Information Technology Management*, Vol. XVII, No. 1, 2006.
- [16] Shih-Wen Chien and Shu-Ming Tsaor, "Investigating the Success of ERP Systems: Case Studies in Three Taiwanese High-Tech Industries", National Pingtung Institute of Commerce, Department of Commerce Automatic & Management, Department of Management Information, Ching Yun University, Jhongli, Taiwan, 23 March 2007.
- [17] Zhang, Z., Lee, M.K.O., Zhang, L., and Huang, X., "A framework of ERP systems implementation success in China: An Empirical Study", *International Journal Production Economics*, Vol. 98. Issue 1, 2005.
- [18] Yizi He, "A Comparative Study of Critical Success Factors for ERP System Implementation in China and Finland", Swedish School of Economics and Business Administration, 2007.