

A Training Model for Successful Implementation of Enterprise Resource Planning

Volker Heierhoff, Aurilla Aurelie Bechina Arntzen and Gerrit Muller

Abstract—It well recognized that one feature that makes a successful company is its ability to successfully align its business goals with its information communication technologies platform. Enterprise Resource Planning (ERP) systems contribute to achieve better performance by integrating various business functions and providing support for information flows. However, the technological systems complexity is known to prevent the business users to exploit in an efficient way the Enterprise Resource Planning Systems (ERP).

This paper aims to investigate the role of training in improving the usage of ERP systems. To this end, we have designed an instrument survey to employees of a Norwegian multinational global provider of technology solutions. Based on the analysis of collected data, we have delineated a training model that could be high relevance for both researchers and practitioners as a step towards a better understanding of ERP system implementation.

Keywords—Business User Training, Enterprise resource planning system, Global consulting company, Role and responsibilities

I. INTRODUCTION

THE last decade, managers have started to recognize the importance of Information Communication Technologies (ICT) use in promoting organizational performance efficiency. Several research studies highlighted the benefits of aligning ICT with the business goals ICT [1], [2]. Among various technologies, Enterprise Resource Planning systems are often described as one of the major development in the corporate use of ICT [3]. Enterprise resource planning enables the creation of an information-based platform gathering process, tools, information and people. ERP systems enable decision making process and collaboration by standardizing information. The business performance efficiency is insured by integrating various business functions including finance, human resource, manufacturing, sales, marketing and so forth.

It is well recognized that an optimum and efficient use of enterprise resource planning system (ERP) is the key enabling the integration of business processes and the building of high

quality and relevant information needed for business decision making [1].

ERP systems have become an important element of the IT infrastructure of large companies. Several research and market studies claimed that investment in ERP Software will continue to drastically increase while worldwide revenue from enterprise resource planning (ERP) software is set to see a 9.5 per cent increase for 2011 [4]. According to the latest report from analysts at Gartner, the revenue could exceed \$267 billion in 2011 from \$244 billion in 2010 [4]. Mechanisms and factors insuring the success of ERP systems implementation have been investigated by both academic researchers and practitioners [5], [6]. It is well recognized that enterprise resource planning (ERP) systems implementations pose major challenges to organizations as many of them fail in their early stages. In testimony the large number of research studies undertaken [6]. Although the outcome of these studies varies, there are several recurring issues such as lack of management support, poor training, change management and minimal ERP customization.

Amongst several factors preventing a full successful deployment of ERP system, there are some concerns related to the training/learning processes. Knowledge user training consistently ranks as one of the top concerns for IT projects. Based on research made by the InfoTech group Managers, rank the training as a key success factor in over 60% of both Portal and Enterprise Resource Planning (ERP) projects. However, interviews with key stakeholders in system development projects also indicate that training/learning processes are consistently overlooked as a project consideration.

Furthermore, although the role and responsibilities assignment is considered crucial, to insure the success of ERP implementation, literature studies indicates that lack of clear leadership could hamper the full use of these systems [7]. Willcocks and Sykes report that “senior level sponsorship, championship, support and participation” is one of the “critical enabling factors if ERP-supported business innovations are to stand a chance of succeeding” [8].

Our research project aims at investigating on one hand, the role of knowledge, training and management in deploying successfully an enterprise resource planning system in large multinational company based in Norway. On the second hand, we intend as well to investigate if employees are aware of the

Aurilla Aurélie Bechina is with the Buskerud College University, Kongsberg, 2603, Norway (phone: +47-92490497; fax: +47-32869883; e-mail: aurillaa@hibu.no).

Volker Heierhoff, was student with Buskerud College University. He is now with the FMC Technologies, Norway (e-mail: volker.heierhoff@fks.fmcti.com).

Gerrit Muller is with the Buskerud College University, Kongsberg, 2603, Norway; (e-mail: gerrit.muller@gmail.com).

roles and responsibilities allocated within the ERP system.

This company is a leading global provider of technology solutions for the energy industry. The Company has more than 6000 ERP users globally. However, the geographical focus for the study was on the Europe and Africa Region where the company has approximately 3000+ ERP users in 6 main locations (5 in Europe and 1 in Africa).

The next section of the paper describes the challenges encountered in training and learning processes in Enterprise Resource Planning. The third part introduces the context of study and describes the adopted research methodology. The process of collecting data and its analysis are outlined. The fourth part presents a general framework encompassing general recommendations fostering the training capability needed for successfully implementing an ERP system. The importance of role and responsibilities will be as well discussed.

II. CHALLENGES IN ERP SYSTEM IMPLEMENTATION

A. Training

Enterprise resource planning systems implementation is often considered as a challenging and daunting task. It usually requires systematic planning, expert consultation and well structured methodology. The process is even more complex when the ERP system is implemented in large organizations with several business units. It might take even several years before the system is fully operational. Therefore, changes in the staff and business work routines are not unusual and could add additional challenges and constraints. The ERP implementation process goes through five major stages: Structured Planning, Process Assessment, Data Compilation & Cleanup, Education & Testing, and Usage & Evaluation [9],[10].

The first stage encompasses project preparation and a comprehensive planning process. Role and responsibilities and budget targets are established. The second step focuses on the analysis of existing business process that will contribute to define the system selection. The third stage concentrates on the development of the technical foundation by data compilation. The fourth stage concerns the testing and more specifically the training of potential users. The last stage focuses on the entire process design integration, test and evaluation. Overview of literature reviews shows that most of the research papers often focuses mostly on the stage one, three and fifth [10]. There is very little research done on the impact of training or education in Enterprise resource implementation and exploitation. In addition, there is a need to investigate if people are aware of roles and responsibilities within an ERP system implementation and use.

Training people that will use the system or will be influenced by it, is crucial as it is important to understand how data flow through the system. According to Lee Meadows, "Once you have made a good selection decision, everything else is Training" [11].

For knowledge based enterprises the need for efficient use

of information and communication technologies is more vital than ever in terms of staying ahead of your competitor and enables the workforce to effectively and efficiently communicate, perform and collaborate.

It is common knowledge that successful training is essential for facilitating adoption and for minimizing IT support costs. IT departments have the role of providing valuable guidance, even if training is ultimately the responsibility of the business unit. The foundation is established in the requirements gathering and design phase of an ERP System.

However, the unfortunate trend in short term cost cutting is to reduce or in some cases, completely eliminate the training budget. Embedded in that budget are skills training, knowledge acquisition and tuition reimbursement. When organizations need to reduce their cost, they usually will cut the training cost as it is considered as an overhead costs. Training is often not perceived as a high priority. However, training is not a 'recreational' luxury to be implemented when times are good, but is an essential survival tool when times are pretty rough. It is important to maintain an ongoing assessment of the internal training needs of the organization while anticipating the changes in the external environment that will dictate new skills and knowledge. Defining an appropriate training approach is seen as an important factor contributing to success of ERP systems. In practice, experiences show inefficient or ineffective training method could lead to decrease motivation to use the system. Often ERP end-users are not system analyzers, therefore, adequate training will foster a positive attitude towards the business goal of the system leading to user acceptance [12].

Training needs to use effectively Business Processes and ERP Systems with the goal to increase profit. However, on the other hand, training people is also seen as a burden because the available labor hours will decreased which in turn will impact the profit rise. The dilemma that most managers encounter is to find the balance between budgets for training verse the benefits.

In order to visualize the need to provide effective Business User Training, we have specified a simple Causal Loop Diagram that is depicted in figure 1. The causal loop represents the different elements and how they interact with each others. Through arrows the different Elements are linked and labeled with either an **S** or an **O**.

S stands for **Same** and means the sending and the receiving Element behaves the same way. Example: increase of sending element means increase of receiving element.

O stands for **Opposite** and means the receiving elements react in the opposite way to the sending element.

By analyzing the causal loop, we see that the execution of Training brings the causal loop in the balancing stage:

- a Balancing Loop when feedback reduces the impact of a change.
- a Reinforcing loop when the feedback increases the impact of a change.
-

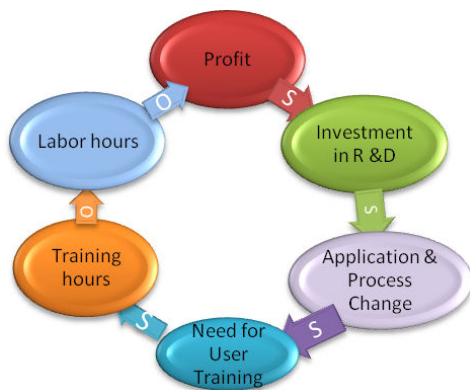


Fig. 1 casual Loop diagram

The theoretical concept for this particular example would be: Maximize the impact of a change by reducing the balancing impact of Training/Training hours of the System. Introduce System/ Business Process changes which need minimal training (theoretical goal O).

B. Roles and responsibilities

Based on the analysis of the organizational structure we have identified the following roles.

- Global Process Owners
 - (ERP Champions at senior management level of a organization which needs to sustained for long term)
- Local Process Owners
 - (E Champions at mid management levels will connect knowledge needs with operations of a Organization)
- Super Users/Process Experts
 - Connectors across an organization and in addition beneficiaries of strengthened knowledge flows
- End users
 - Knowledge consumers and beneficiaries of strengthened knowledge flows
- IT Department
 - Enabler and technical support of knowledge Management solutions

III. CONTEXT OF STUDY

The aim of our research study is to delineate a training model related to ERP system. We aim as to investigate the awareness of employees about the Roles and responsibilities assignment within an ERP system. To this end, we have selected a multinational company with more than 3000 ERP users based in 6 main locations (5 in Europe and 1 in Africa).

The research investigation will contribute to better understand how to increase efficiency and effectiveness by improving Business and ERP System knowledge.

To maximize and optimize the data collection, a mixed

approach based on Quantitative research and on Qualitative research has been used.

An online questionnaire was designed using the SharePoint 2007 Platform. The choice was dictated by the need to easily collect data from different departments and locations around Europe and Africa. To increase the chance of a high response rate the decision was made to send the questionnaire as a link on an e-mail rather than directly from the SharePoint application. The purpose and procedure for questionnaire were explained.

The Share Point monitoring capabilities concerning surveys were used which allow monitoring at an overall level but also on the specific question level. In order to make the survey anonymous, easy and convenient no user name or password were required to execute the online survey. The Survey was designed to be completed in a time frame of less than 8 minutes, which was tested and monitored by a control group before it was sent out.

Qualitative approaches were conducted by performing several interviews with different Stakeholder levels reaching from middle management to end users. The aim was to understand the work routines, the interaction between the organizational layers (End Users, Super Users, Local Process Owners, Global Process Owners and IT) and the interaction between the different geographical locations. The Qualitative methods gave valuable input and significantly contributed to the design of the online survey.

IV. FINDINGS AND DISCUSSIONS

A Web survey, interviews and observations were used to answer the following questions.

1. How would you rank the ERP System knowledge level of Super Users and End Users in your functional area?
2. Can Super Users/End Users perform an effective and efficient Job with the current ERP System knowledge level?
3. Which Organization unit/person group is responsible for ERP System relevant knowledge of Business Users?
4. Which Organization unit/person group is responsible for Business Process relevant knowledge of Business Users?
5. Which Organization unit/person group is responsible to perform ERP System Training and ERP System Training Material?
6. Which Organization unit/person group is responsible to perform Business Process Training and ERP System Training material?
7. What is your most common way of Business communication?
8. What is your most common way of collaboration?

The survey was sent to approximately 3000 persons and we received 470 responses which gives a response rate of 16 %. It can be considered as high, because studies indicate the difficulty and challenge to get responses by sending out surveys by mail or e-mail. The normal survey response rate is rather between 4% and 6%.

A. Demographic data

The characteristics of the respondents are as follows:

The surveyed Organization is a Project driven Engineering Company and this is reflected when we see that over 50% of the responses came from the Projects department and the Product and System Engineering department (28% and 23% respectively).

The survey also showed us that 35% of the workforce is between 3 and 7 years with the company, 32% are more than 7 years with the company and 28% are between 1 and 3 years with the company.

The result of the question concerning the use of a particular System called SAP (main ERP System) shows that the absolute majority of the workforce 63% had no SAP System knowledge before they joined the company. 60% saying that they use SAP on a daily basis and 27% on a weekly basis and only 3% of the responses indicate that they never use the SAP System.

The Fig 2 shows the ratio between the different knowledge worker groups that participated in the survey.

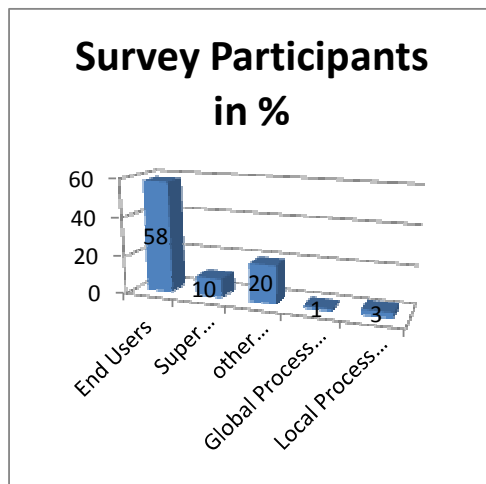


Fig 2 Survey Participants in %

End users represent more than 58% of the sample. This is predictable as they are not many people are part of the global process owner category.

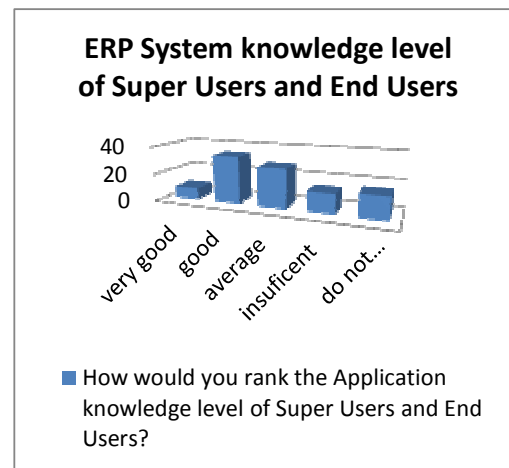
B. Knowledge level

The outcome of the question concerning the current ERP System knowledge level of Super Users and End Users had shown us a 42% possible improvement rate to bring the workforce to good ERP System knowledge (58 % by including the “do not know” responses).

The outcome was expected and supported by the fact that 29% of the responses to a Yes or No question indicate that Business Users do not have the appropriate knowledge to perform an effective and efficient work routine. This is mainly due to the lack of knowledge of ERP System and Business Process knowledge. By including the 30% “do not know” responses this figure rises to 59%. This is inline what the literature has indicated. For example, the work described in [13] also indicates that training is crucial for the acceptance of the system. User training including both technical and business processes, helped companies to overcome assimilation knowledge barriers.

Gupta [14] confirmed that training as one of the most important factors in ERP success. Training helps to improve employee participation and involvement. According [15] , without proper training about 30 percent to 40 percent of front-line workers will not be able to requirement of new system [15].

However, one the most important challenge is to define an adequate training model. We have delineated a model based on the collected data. This model is presented in the next section.



C. Role and responsibilities

In our research study we want to analyze awareness of the role and responsibilities. To this end, we have elaborated a set of questions related the knowledge of who was responsible for ERP System/Business Process. We wanted as well to know if people were able to point the responsible of the training or training material.

The fig 4 shows the different perceived responsibility level of ERP systems. We have defined four level of responsibilities such as :

1. Responsible to perform process training and application of training material
2. Responsible to perform application training and application training materiel
3. Responsible for process relevant knowledge of business user

4. Responsible for application relevant knowledge of business user

The results indicate that concerning ERP System relevant knowledge the majority of responses (30%) indicate the Super User Group as the group of people which have the responsibility followed by the Local Process Owner Group (20%). For Business Process relevant knowledge 38% are looking towards the Local Process Owner group when it comes to the responsibility followed by the Super User Group with 18%. IT is seen to play a minor role: 11% concerning ERP System knowledge and 6% concerning Business Process knowledge.

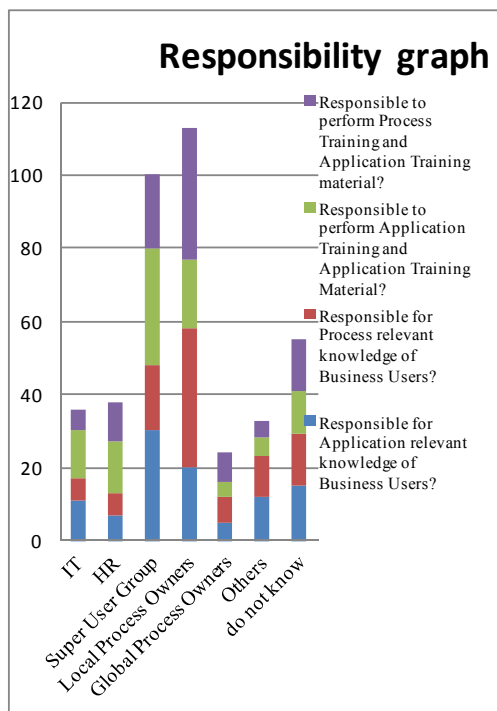


Fig. 4 Responsibility graph (Y axis in %)

Concerning ERP System Training and Training material the responsibility is seen with the Super User group (32%) followed by the Local Process Owner group (19%). Towards the Responsibilities around Business Process Training the majority of the responses (36%) see the Local Process Owner group as responsible followed by the Super User Group (20%).

By taking a closer look at the feedback that the survey received under the category "others" we see that the majority of responses see a combination of IT, Super User and Local Process Owner as responsible for the ERP System. The same applies for Business Process Knowledge of Business Users and the responsibility for Training and Training Materials.

Analyzing the "do not know" section we see that the highest results (15%) where when we have asked who is responsible for ERP System knowledge and the lowest results (12%)

where when we asked about the responsibility around ERP System Training and Training Material.

The results show that the Super User and the Local Process Owner group are the groups of people which are seen to have the responsibility for the knowledge level of the Business Users. They are also seen to be responsible for performing training and managing training documentation.

By asking the question "would a full time Super User be a better concept than a part time Super User?" 48% of the responses indicate yes, it would be better to have a 100% dedicated Person as a Super User while 31 % said "no" and 20% responded "do not know".

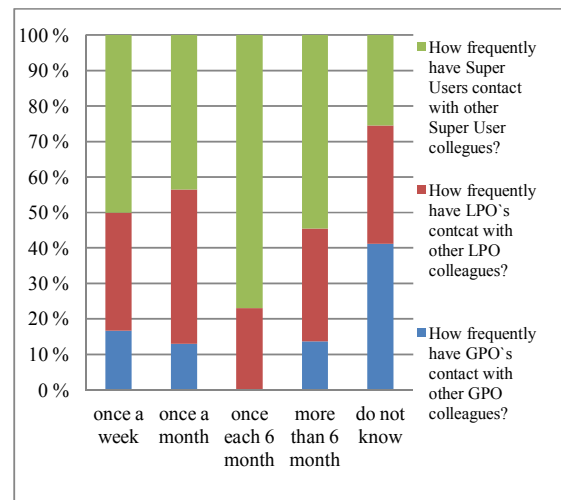


Fig. 5a Super Users & End (Y axis in %)

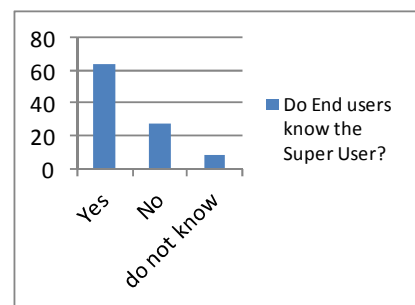


Fig. 5b Super User & End User (Y axis in %)

When analyzing the way the Business Organization is communicating we see that 58% is using E-mail as the most common way and when it comes to collaboration we see that face to face meetings 35% are used as the most common way. When it comes to collaboration and people are in contact with each other we see, based on the given feedback, how uncertain the Survey participants are. It will take deeper analysis and research to find out the root cause of the high "do not know" responses but a lack of clarity concerning Roles and Responsibilities is the most likely the reason. In conclusion we can outline the following:

1. 58 % of the workforce needs ERP training to fulfill their Jobs effectively.
2. Local Process Owners are seen to be responsible for Business Process Training.
3. Super Users are seen to be responsible for ERP System training.

V. ERP SYSTEM TRAINING MODEL

Based on the analysis of the collected data outcomes of the performed survey, informal discussions and practical experiences the goal is to establish a training plan process concerning ERP System projects as an essential part of the System Development lifecycle. A training plan and process must be articulated for significant ERP System projects. Enterprise Resource Planning (ERP), Customer Resource planning (CRM), and Business Intelligence (BI) initiatives should all be accompanied by a training plan. Depending on the project, this accountability might not lie within the IT department. IT management should, however, have some involvement since training has a direct impact on support costs and because IT's development documentation is a valuable input for training documentation.

The fig 6 illustrates the training process plan.

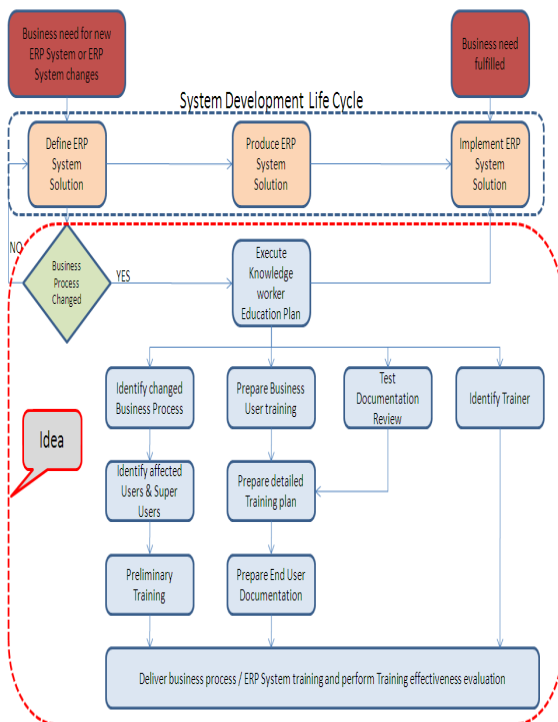


Fig. 6 Training Plan development process

Identify changed Business processes:The main aim for training must be to help people to get their jobs done and the training project must identify business processes that have been changed by the introduction of a new systems/functionality.

Identify affected users:Changes to business processes will

affect users differently depending on the effected functional areas. Different user groups have different training requirements due to their particular states and traits. It's particularly important to identify technology laggards who may be unfamiliar with basic computer concepts.

A second group of users that must be identified are Super Users, meaning individuals with advanced technology or ERP System skills that are part of a business unit (i.e., not part of the IT department). These skills may be related to either states or traits. Super Users have an important role in providing on-the-job support to their colleagues following the completion of formal training.

Deliver preliminary training:A certain level of training is required for both laggards and super users before the start of official training.

- **Deliver basic technology training.** Laggards must develop some level of basic computer competence. Without basic understanding, these individuals will be unable to develop positive cognitive and meta-cognitive outcomes. Furthermore, their affect will be negatively influenced.
- **Integrate Super users.** Super users also require an introduction to their new role. They should go through training with the expectation that they will ultimately fill the role as Super users. Formally integrating Super users may involve changes to performance appraisals.

Prepare business process training:ERP System users must learn how to complete specific tasks and how to deal with exceptions to standard workflows. Providing instruction on business processes in anticipation of ERP System-specific training enables users to develop appropriate cognitive and meta-cognitive capabilities in addition to ERP System skills.

- **Prepare curriculum:**The specific training program should meet the needs of the business users. Business-process training should address the interrelations of various processes and should provide some instruction on how users can overcome various exceptions.
- **Prepare end-user documentation:**Training must be supplemented with end-user documentation that identifies common business tasks and processes and demonstrates how to complete those processes. This documentation should be very task-focused. Use Cases are often the fodder for ERP System training scenarios as they identify all the major functions, the user-system interaction, and all the exception flows.

Review testing documentation to identify problems:One of the key inputs for Training Plan development is a review of the testing documentation. Problems that emerge during testing foreshadow the problems that will be experienced by users of the new ERP System. Both the Training plan and the documentation should be prepared in light of testing documentation.

Identify Trainer:A number of different parties can

actually. Larger organizations may have dedicated departments for training. Individuals from these departments will work in concert with the project team to develop the appropriate training materials. Other enterprises will depend on a vendor, consultant, or system integrator to deliver training. In this case, the project team will carry the responsibility of ensuring that the training program actually meets corporate goals.

Deliver business-process and ERP System training: Employees should get instruction on business processes prior to tool- or ERP System-specific training. This instruction should focus on corporate wide processes and how the tasks and routines of specific departments factor into these processes. Introducing business processes inculcates a sense of project importance and is crucial for developing learning outcomes related to cognitive, affective, and meta-cognitive goals. Integrated with business- process training is ERP System-specific training. It must be customized to match the tasks and routines of the audience. Learners, for example, need to know how to complete their assigned business tasks. IT-specific nuances of a particular System such as Apl calls or customization options are generally not relevant to a business audience.

Evaluate training effectiveness: Training generally runs in an iterative process. Every project represents an opportunity to learn and apply those lessons to the next technology project or the next group of users. IT leaders should ensure that the training meets the needs of the business units and that the ancillary documentation is appropriate.

VI. CONCLUSION

ERP System related should be included in the strategic plan of an Organization. It is important that IT is aligned with Business goals. Based on data collected through survey and interviews with employee of a large multinational companies using ERP system, we have pointed out the importance of training. However, the outcomes of the study highlight that although the requirement of training is expressed, there is still a need to define a training model. Training is important as it will play an important role in the acceptance of the ERP system by the users. In addition, the study highlights the importance of insuring an appropriate Organizational Structure clarifying the role and Responsibilities.

REFERENCES

- [1] V. Mahadevan, J. Agbinya, and R. Braun, "Analyzing Usability Alternatives in Multi-criteria Decision Making During ERP Training," in *Information Technology Based Higher Education and Training*, 2006, pp. 296 -309.
- [2] J. Yang and H. Jiang, "Research on Model of Teaching about ERP Platform Simulation in MIS Education," in *Wireless Communications, Networking and Mobile Computing*, 2008. *WiCOM '08. 4th International Conference on*, 2008, pp. 1-4.
- [3] Y. Kwak, J. Park, B. Chung, and S. Ghosh, "Understanding End-Users' Acceptance of Enterprise Resource Planning (ERP) System in Project-Based Sectors," *Engineering Management, IEEE Transactions on*, vol. PP, pp. 1-12, 2011.
- [4] <http://www.erpinsights.com/>. (2011) ERP and Accounting Software Industry. Available: <http://www.erpinsights.com/crmindustry.htm>
- [5] [2] J. O. Otieno, "Enterprise Resource Planning (ERP) Systems Implementation Challenges: A Kenyan Case Study, Business Information Systems." vol. 7 W. Abramowicz and D. Fensel, Eds., ed: Springer Berlin Heidelberg, 2008, pp. 399-409.
- [6] A. Mishra and D. Mishra, "ERP System Implementation: An Oil and Gas Exploration Sector Perspective, Product-Focused Software Process Improvement." vol. 32
- [7] S. Sarker and A. S. Lee, "Using a case study to test the role of three key social enablers in ERP implementation," *Information & Management*, vol. 40, pp. 813-829, 2003
- [8] L. P. Willcocks and Sykes, "The role of the CIO and IT function in ERP," *Communications of the ACM* vol. 43, pp. 32-38, 2000.
- [9] I. C. a. Ehie and M. Madsen, "Identifying critical issues in enterprise resource planning (ERP) implementation," *Computers in Industry*, pp. 545-557, 2005.
- [10] <http://www.tech-faq.com/>. (2011) ERP (Enterprise Resource Planning). Available: <http://www.tech-faq.com/erp.html>
- [11] L. Meadows, "The Importance of Training," ed: <http://www.pri-network.org/resource/docs/997/TheImportanceofTraining.pdf>, 2008.
- [12] A. Noudoostbeni, N. M. Yasin, and H. S. Jenatabadi, "A Mixed Method for Training ERP Systems Based on Knowledge Sharing in Malaysian Small and Medium Enterprise (SMEs)," in *Information Management and Engineering, 2009. ICIME '09. International Conference on*, 2009, pp. 244-247.
- [13] W. Cheng-Hua, L. Lu-Wen, and C. Yi-Ying, "The effect of ERP software interface design and cognitive function on performance of user learning," in *Service Operations, Logistics, and Informatics (SOLI), 2011 IEEE International Conference on*, 2011, pp. 225-230..
- [14] Gupta, A. "Enterprise Resource Planning: The Emerging Organizational Value Systems," *Industrial Management + Data Systems* 100(3), 2000, 114+.
- [15] A. Peslak, G. Suvramanian, and G. Clayton, "The Phases of ERP Software Implementation and Maintenance: A Model for Predicting Preferred ERP Use," *Journal of Computer Information Systems*, 2008.