

# **A MODEL OF LEARNING PROCESS OF SAP USER-SPECIALIST INTERACTION: A CASE STUDY FROM SAUDI ARABIA**

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## **Abstract**

SAP (Systems, Applications, and Products in Data Processing) software is an enterprise-wide package that strongly integrates all necessary business functions into a single system with a shared database. A SAP information systems development is a learning process that requires potential system users and specialists to interact and learn new business perspectives in order to adapt the system. The objective of this research is to investigate ways of learning that may develop during SAP implementation and for this purpose; we introduce a model of learning process of SAP user-specialist interaction. During our analysis, we identify three ways of learning processes. System users or specialists could accept, modify, or reject the process of learning. Subsequently, three types of learning process have been identified including one, two, or no-way process of learning. The research draws its conclusion through a detailed analysis of an in-depth interpretive longitudinal case study of one of the first petrochemical companies to implement SAP in Saudi Arabia.

## **Key Words:**

Learning, Process approach, User and specialist interactions, SAP, longitudinal case study, Saudi Arabia,

## **Introduction:**

In SAP design, all necessary business functions such as finance and accounting, human resource, supply chain, sales and customer service, manufacturing and logistic will combine into single, integrated software that runs off a joint database so that the various departments can easily share information and documents with each other. The software is designed for the client/server environment in which part of the processing is done on the user's PC (the client) and part is done on shared computers (the server) (Scapens and Jazayeri, 1998). Arguably, SAP can serve many types and sizes of associations in different industrial sectors through a number of modules such as financial accounting, human resource, plant management, project system, quality management, sales and distribution, and material management. These modules contain business process references are called 'best practices' because they have been implemented and proven in many world-class companies (Lee and Lee, 2000).

It is been claimed that, SAP 'best practise' modules address the requirements of most organizations and are available for selection based on individual needs. These modules are highly customizable to suit the needs of a variety of organizations. SAP ability to transform organizations should not be taken for granted yet it should be subject for investigation. In many cases 'best practise' approach introduces substantial rigidity and complexity to the implementation process that requires more effort and cost to customize (Poston and Grabski, 2001). Organizations like FoxMeyer, Mobil Europe, Dell, and Dow Chemical (Davenport, 1998), or Siemens, Panasonic and Bruno Magli (Robey *et al.*, 2002) have experienced numbers of shock stories of either complete failure or unmanageable projects. In response to that a variety of academic literature has been develop to address the system and organizational development issues for better understanding (Fahy, 2001, Verville and Halington, 2003, Ross, 1998, Anderegg, 2000, O'Leary, 2000).

Information systems such as SAP and organizational development rest not only upon technical aspects but also upon social aspects (Robey and Newman, 1996). Social characteristics such as stress (Wastell and Newman, 1996), commitments (Newman and Sabherwal, 1996), resistance and change (Hirschheim and Newman, 1988), and learning (Pentland, 1995) had been ignored in related information system development research. Currently, studies are giving more attention to investigate how these social aspects could affect the process of information systems and organizational development (Newman and Noble, 1990). The learning process during a SAP implementation is a complex social phenomenon in which a collection of organizational users and SAP specialists interact to implement the system correctly. Considering limited research addressing learning issues during system developments, studies of investigating learning process as a result from users' and SAP specialists' interaction and how such interactions may cause the process of learning to change a long side SAP and organizational developments are almost rare.

The objective of this research is to investigate in-depth the process of learning during the life of SAP and organizational development process throughout analyzing potential interactions that may take place between users and SAP specialist and investigating how such interactions may change the process of learning during the project lifetime. In doing so, this paper introduces a learning process model of SAP user-specialist interaction. We are concerned in describing and explaining types of learning processes. Therefore, we adapt in broad terms that learning could involve knowledge, skills or business process transfer. This paper is organized by introducing in brief the research model's theoretical background followed by an explanation of the research approach. The research conclusion will follow a detailed analysis of an in-depth case study involving a petrochemical company in Saudi Arabia.

### **A Model of Learning Process of SAP User-Specialist Interactions:**

Prior research in organizational developments have been performed either by studying what antecedents or consequences conditions of SAP implementation, or by investigating how organizational developments emerge, develop, and continue or terminate over time (Van de ven and Huber, 1990, Boudreau and Robey, 1999). To answer the what question, researchers need factor (Newman and Robey, 1992) or variance theories (Sabherwal and Robey, 1995) in which independent factors such as user learning is identified and tested empirically for casual links to predictable dependent outcomes such as system success. It has been argued that this

approach explanation is typically entail restrictive and unrealistic assumptions about the order and sequence in which events unfold in an organization (Van de ven and Huber, 1990). A process approach differs from the factor approach in which the researchers focus and examine a social phenomenon such as learning process through analyzing a sequence of events occurred during the process of SAP and organizational developments (Van de ven and Huber, 1990, Newman and Robey, 1992). Both factor and process approaches have been a big help towards understanding complex information systems developments phenomena.

Organizational learning studies such as Argyris' and Schon's (1978) model of single and double loop learning and Virany's *et al* (1992) investigation of first and second order learning, all contribute towards understanding the complex learning processes involving information system developments. When SAP is being adapted, organizational information systems users are expected to acquire new ways of performing their jobs. Lavitt and March (1988) refer to the type of learning that occurs during implementation as learning-by-doing and that occurring following implementation as learning-by-using. In this paper we are concerned with exploring in more types of learning process that take place during the implementation of SAP technology.

Attewell (1992) describes information technology adoption such as SAP as a learning process and Pentland (1995) has argued that there is close relations between learning process and information technology development. Even though many studies use different research approaches, the combination of factor and process approach in studying learning and system development is still under investigation (Sabherwal and Robey, 1995). While some studies issued warnings about integrating these two approaches (Mohr, 1982), other studies (Newman and Robey, 1992) argued that factors and process models could be complementary. Initially, we can depict as shown in (figure 1) the simplest way of learning which is viewed as a single or one-way learning process (Newman and Noble, 1990). SAP specialists are expected to educate or train potential system users how to implement SAP. We mean by SAP specialist is any system expert who acquire an advanced level of knowledge and skills about a software such as SAP consultants or developers. We mean by system's user all implementation teams members who is asked to participate in SAP implementation project.

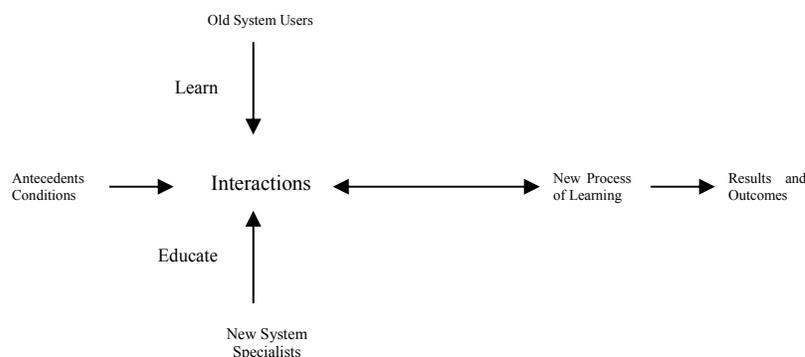


Figure 1: The Initial Learning Process Model

In a complex SAP implementation, learning could take different ways. For example, Boland (1978) introduced a mutual or two-ways learning process in which users and SAP specialists recognize each other needs and capabilities, and cooperate to produce joint resolutions of a common obstacles. Furthermore, and following Newman and Robey (1992), we recognize the importance of antecedent conditions that may contain activities such as describing legacy system in detail and listing reasons and motivations for the change that could affect the process of learning and needs to be taken into consideration. During project implementation organizational system users (team members) and SAP specialist (consultants) are expected to interact in various and complex ways. As users and SAP specialists interact this way of learning process is expected to change allowing many revised learning processes to emerge. Outcomes such as the quality of project implementation or how implementation process proceeds in many aspects depend on how learning is being processed.

### **Research Approach:**

It was determine that longitudinal case study is the most appropriate method in conducting such kind of research. We visited the research field many times in order to reach a reasonable level of case understanding that allow us to draw the study findings. We visited the study site two times in 2002 and 2003. In both times we spend three full months of June, July, and August in the company. The case study, ABC was selected because of four reasons. 1) The excellent level of access we obtained. 2) The number of SAP modules ABC implemented was a total of seven modules covering mostly all company's departments. 3) The number of ABC's employees who participated in the implementation teams and still working at the company. 4) In addition, the personal contacts the author who worked at the company in 1995.

Data was collected through mainly 25 semi-structured interviews with company's key members. 13 of 20 employees were involved in the project and still working at the company has been interviewed more than once. All interviews were tape recorded and transcribed. The interviews last one hour and a half in average. Data collection was supported by rich notes taken from observations and informal talks beside collections of good numbers of reports and documents. Interviewed were planned and scheduled a head of time. We asked the interviewees open questions and encouraged them to tell the full stories of the project implementation. Most of the interviewees were comfortable with such way of data collection which make them confidence to speak openly and in a good faith. We attempted to make sense of the process of SAP and organizational development through an interpretation to the meaning ABC-SAP information systems users and SAP specialists assigned to SAP project and its development (Walsham, 2002, Klein and Myers, 1999).

During our analysis we developed themes and categories. We followed main and most repeated events interviewees have mentioned or used as titles for SAP documents or project schedules such as "AS IS", "TO BE", Mapping and customization, integration points, and testing and going live. Using these themes as guidelines, we summarized a collection of interviews transcriptions, number of documents, and our notes taken of observations to construct historical narrative stories of SAP development process, in which the process started, processed, and completed. When we analysed the interviews the aim was not to detect who

the one was telling the closest answers to what we think was right story. Instead, we tried to collect different interpretations and view points from different level at the company.

We were limited in some extent by our ability to translate all interviews expect two from Arabic to English language. Due to high cost to translate the interviewees by a professional translator, we had to rely on our ability to do that. Another limitation of the research was that we were not able to interview any of SAP-AG specialists who participated in the implementation. We were able to just interview ABC IT department personnel who recruited as SAP specialists and were and still members of project development team. However, we do not believe these limitations effect the validity of our research conclusion. The following section introduces a details analysis of the research case study in which we focus on identifying ways of learning during SAP implementation through an analysis of users-specialist interactions.

### **Case Study: ABC Petrochemical Company**

SABIC's (the Saudi Basic Industrial Corporation) businesses are grouped into five core sectors: Basic Chemicals, Intermediates, Polyolefins ,PVC and Polyester , Fertilizers and Metals. The concept of partnership was at the core of SABIC growth and business strategies. SABIC entered into joint venture partnerships with industry leaders from around the world, offering a share in the Saudi resources for their technology, support in human resource, development, and global marketing. We have performed our study using one of SABIC affiliates in the petrochemical sector based on Al-Jubail Industrial city, eastern province, Saudi Arabia. We had been asked not to reveal the company and the interviewees identifies. Therefore, we refer to the company by "ABC" and refer to the interviewees using their job titles.

### **Antecedents' conditions**

The company got their first PC by the start of 1982 and in 1984; ABC bought their legacy system. That system mainly served the accounting and finance and the IT departments. Almost all other departments in the company did not have any technological systems and they remained with a manual system. The legacy system in its good days produced the financial statements by the mid of the following month. In case of unbalanced financial books accountants would spend a long time trying to find out the problems and fix them. Many times accountants create temporarily accounts just for the sake of balancing and closing their books.

Many reasons motivated ABC to change its information systems. The legacy software was not supported. The company was afraid that the system could break down at any minute. The Y2K problem was a daily talk in the 90's. Almost every company in the region either started thinking or looking for a substitute for their legacy information systems. One of the biggest problems for the company in the legacy systems was the reporting. While there was a system that helped in reporting the financial statements, there was no such system could help in producing other reports such as maintenance or production reports in which they were prepared manually.

The new system had to help the people in accounting and finance, the people in production, and other people in the company and with excellent reporting abilities. The new system also had to serve the needs of the company's development and growth. Top management developed a team that included every department's manager and some personnel from IT department. Teams' mission was to identify and suggest a new system that could replace legacy system. Initially, SAP was selected among other software packages for the reasons listed before. ABC decided then to implement seven modules of SAP 2.2 version including FI (Finance), CO (Costing and controlling), HR (Human Resource), PM (Plant Maintenance), SD (Sales and Distributions), PS (Project systems), and MM (Material Maintenance).

### SAP Systems Implementation

ABC started in 1994 to negotiate the contract with SPA-AG who estimated that ABC needed 276 visits in order for SAP to be implemented. SPA-AG via their consultants asked ABC to develop teams for the implementation. The teams had to be mixed with department's personnel and IT experts. The members had to be able to work with the computer, had a good level of English to communicate with SAP consultants, and must had a good knowledge and experience of business processes in their departments. It had been agreed that SAP-AG consultants just train implementation team members to customize and set up the system and not to implement SAP themselves.

Many departments' managers rejected the idea of giving up their best employees to implement SAP that they did not know. The project manager empowered by the top management started several meeting with those managers and tried to convince them of how important SAP implementation to the company and how the system would benefit them. 32 employees were enrolled in the implementation teams. The teams were gathered and informed that they will have a mission to learn and implement SAP system at the company and pass the level of knowledge and training to their departments' employees after the implementation. In the early SAP project periods SPA-AG consultants asked all teams members, in one-way learning as shown in (figure 2), to report and document in either step listing or is flowcharts current business processes in their departments in an input-process-output fashion is a process called "AS IS". The teams accepted that without any problems.

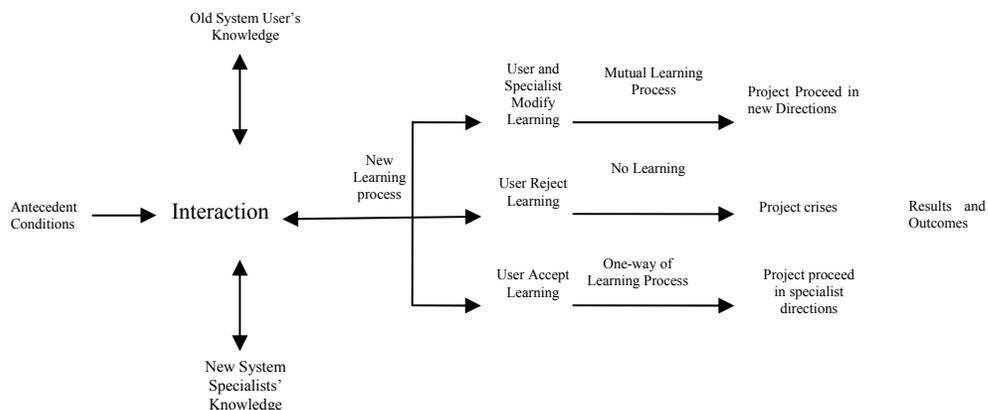


Figure 2 Use-Specialists Interaction as a Learning Process Model

The teams spent 6 to 7 months in a one-way learning and training on the system. The process of learning was being done as follows: the consultants demonstrated how the system works to the teams and gave them many tasks and homework. The team members had to practice these tasks while the consultants were away. SAP developments machines as a learning tool was a big help to all members for real system interactions and learning. One of team tasks was to set up and configure the system to reflect ABC environments including setting up the accounts charts, the cost and profit centres, vendors and customer's numbers, department's structures, calendar year and the currencies ext. Unfortunately, some of the employees especially the expatriates who were members in the teams betrayed their agreement with the company and left in the middle of the implementation. That was a big problem jeopardized the whole project. By losing some of team members the process of learning stopped. There was no-way of learning which endangered the whole project.

*“Some of crucial team members posted their resumes in the net and got outstanding offers from around the world. Some of them took an emergency vacations and never came back. It was a crisis. All knowledge ABC built on these ungrateful employees were gone” (IT Manager, 2002, pp5 )*

Another obstacle was regarding the consultants' visits which almost finished. The process of learning would stop if SAP-AG did not train ABC team members. In a situation of mutual learning and modifications, ABC reached an agreement with SAP-AG to have extra 150 mandates. Team members then had to go back to their department and educate their employees about SAP and its “best practise”. They listed selected SAP business process called “TO BE”. Team members then had to compare and map “AS IS” and “TO BE” process for the purpose of selecting future process that would be implemented. The general plan was to adapt SAP salutation as much as they could or what they called ‘SAP vanilla’.

The main characteristic of the process of learning during this time was the mutual learning between team members and departments employees in one side and SAP-AG consultants in the other side. As many interviewees indicated that mapping and installing the system process was not a hard one because of the training and knowledge volume teams members reached that allowed them to work comfortably with the system. Every team had to customize their modules separately and then integrate. Every module had to be re-customized to fit the whole picture of the company transaction cycles. This phase took almost 6 to 7 months. The process of learning took mixed direction between acceptance and rejection.

Teams were gathered in one big room to integrate all modules which had significant payback for more sufficient communications to complete the project. Teams were able to interact with each other directly and in time. The teams moved slowly in this process until a complete picture of ABC-SAP modules was developed. Some members especially in the accounting department asked for real data to be converted by the start of the next fiscal year to give them time to clean up the system. Project manger insisted to transfer the data before that time and not to wait until the end of the fiscal year. Some of the data were converted in detailed and some of them were converted in joined accounts like in the case of accrual and receivables accounts.

*“The pressure from top management was tremendous on me and three or four time we delayed SAP to go live. I had to take a decision” (IT manager, 2003, pp103).*

The modules had to be tested before the decision had to be taken to switch off the old system. In March 1997 and after almost 2 years and 3 months, ABC started working in SAP system only. ABC went through a stage of system stabilization in which after implementation systems problems needed to be reported and fixed in continues learning process. Going back to data conversation conflicts before ABC switched off legacy system when the accountants converted some accounts in total amount not in details. These balances were not cleared out because it was very difficult for the accountants to figure out which account is related to which.

### **Results and Outcomes**

The general feeling in ABC regarding the implementation was positive because of two reasons. 1) Most of system results were encouraging and SAP benefits were obvious. 2) ABC through the learning process during the project implementation was able to develop teams of SAP experts. SAP reporting cycle improved dramatically. Not only financial statements but also production and other departments’ reports could be generated and be ready almost in time whatever needed. The company was able to cut the cost and reduce the manpower through redesigning company’s business process. In accounting department for example 25% of the manpower was reduced. The system increased the level of efficiency and productivity of the employees. Employees could go through the system and able to trace any transaction just by clicking on the numbers in the screen of their PC’s until the roots of any transactions.

One of the reasons motivated ABC to go for SAP was the possibility of continuous development and continuous learning in which new functions of the system could be added. ABC upgraded the system two times. They implemented version 2.2, and upgraded the system to 3.1 until the last version implemented which was 4.6c. ABC usually did not face any major problems. Most of whom we interviewed reasoned that for implementing SAP best practice most of the time and more importunately for having good number of SAP system specialists that the company developed during the implementation due to the level of learning those employees received.

### **Conclusion**

We were able to identify certain ways of learning processes. User (team implementation members) and SAP specialists (consultants) exchanged their expertise about old and new information systems in many occasions. As our analysis revealed, in some cases especially in the early implementation time, users accepted what SAP specialists asked them to do such as the way users describe and report existing work process in ABC. This process is identified as a one-way learning process. In the majority of cases, like in SAP customization process, users and SAP specialists exchanged and shared their knowledge and experiences. We identified this kind of process as a mutual-way of learning. In other rare cases, users or SAP specialists rejected the process of learning whether by users leaving implementation teams or by SAP specialist refusing giving more training to the users. We identified this way of learning as no-way learning.

Finally, we would like to stress the importance of learning process to implement such a large information technology like SAP. Many things could go wrong during the interactions between old and new system personnel during the lifetime of a complex process of implementation. In this research, we introduced a model that could be used and employed by researchers and practitioners for further SAP implementation projects implications. SAP implementation is a complex process in which we do not claim that our model grants the ideal process of learning. Instead, we attempt to introduce a way for better understanding to the process of learning of SAP and organization development and how the process of learning revised over time through analyzing sequence of event of SAP users' and specialists' interactions. A model was inductively developed throughout an analysis of in depth case study in Saudi Arabia and further empirical research to test the validity of this model in different organizations is being called.

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