

# ***BUSINESS PROCESS RE-ENGINEERING: A CASE STUDY AT TURKU UNIVERSITY OF APPLIED SCIENCES***

**Juha Kontio**

Turku University of Applied Sciences

## ***Abstract***

Business process re-engineering is an approach where processes are developed to maximize an organization's potential. This research presents a case study at the Turku University of Applied Sciences describing a re-engineering process of human resource management related to organizing teaching and other tasks in degree programs. We use the diffusion of innovations theory as explaining theory. We present three phases of the re-engineering process starting with the original process and ending to a new re-engineered process. The research shows that the HRM process has improved significantly, but the overall process took quite a long time. The research also confirms the essential role of management support in a re-engineering process.

***Keywords:*** *Business Process Re-engineering, Diffusion of innovations, Case study.*

## **1 INTRODUCTION**

Business process re-engineering is an approach where processes are re-structured, re-designed and re-engineered so as to maximize an organization's potential (Blyth 1997). The re-engineering we are introducing here is about a human resource management process related to organizing teaching in degree programs. During this process, the curriculum is turned into resources to teachers for giving lectures and labs. In addition, other resources can be allocated to teachers. Finally, teachers' yearly working plans are ready to be approved.

Re-engineering is a radical or breakthrough change in a business process (Dixon, Arnord et al. 1994). In our case, the radical change is moving from a manual system to a web-based information system. Blyth (1997) wrote that when re-engineering a business process you are re-engineering the method and means by which an organization and an individual fulfil responsibility. Here we are re-engineering the method and means by which our organization and our individuals fulfil their responsibilities. However, as Dixon et al. (1994) report developments in information technology is not driving organizations to attempt re-engineering, but re-engineering processes definitively incorporate improvements in information technology. Our case confirms these results since the roots for re-engineering were in the poor and heavy process itself. The re-engineering process focuses on the desired results from a process, rather than on the functional or individual need of units (Dixon, Arnord et al. 1994). In the Turku University of Applied Sciences, the most desired result was more reliable and fluent resource management process.

The aim of this paper is to analyze and describe the re-engineering process at the Turku University of Applied Sciences (TUAS). This paper gives real-life examples that could help others thinking or running a business process re-engineering project.

In this paper, the progress of the re-engineering process is described with the diffusion of innovations theory (Rogers 1995). We use this theory because we see that the new information system had a very important role in this re-engineering process. We can say that we are concerned with an IS innovation which is defined as innovation in the organizational application of information technology (Swanson 1994). Swanson (1994) continues that most IS innovations will incorporate both information technological and work organizational features.

The paper is organised following. First, the research methodology and the research environment are introduced. Section 3 concentrates on innovations in organizations. Sections 4 to 6 describe the three parts of the re-engineering project starting from the original process and ending to the new process using a web-based information system. Finally, we give concluding remarks.

## 2 RESEARCH METHODOLOGY

This paper uses qualitative approach and is a descriptive case study. In general, a case study aims for in depth-understanding of the context of the phenomenon (Cavaye 1996). Furthermore, a descriptive case study presents a complete description of a phenomenon within its context (Yin 2002). A case study is well-suited to capturing the knowledge of practioners and to document the experiences of practice (Benbasat, Goldstein et al. 1987). This paper follows interpretitive tradition of the case research. It means that there is no objective reality, which can be discovered by researchers and replicated by others (Walsham 1993; Broadbent, Darke et al. 1998). During the period this paper is about (2000-2006), the researcher acted like an action researcher (Walsham 1995) as he was a member of the case organization.

The units of analysis in this research are the faculties at the Turku University of Applied Sciences. Universities of Applied Sciences are normally regional higher education institutions providing higher professional education with a close connection to working life. Turku University of Applied Sciences is organized in multidisciplinary education units/faculties (Figure 1). In addition, there is a central development unit coordinating for example international relations, library developments and information technology. Education units have a mixture of different degree programmes (37 altogether) and about the same number of degree programme managers responsible for organizing teaching in their programmes. Most of our education units have operations on many locations in southwest Finland (Figure 1).



Figure 1. Organization and locations of Turku University of Applied Sciences.

This research focuses on re-engineering a human resource management process related to organizing teaching in a degree program at the Turku University of Applied Sciences. We describe how the process was re-structured, re-designed and re-engineered. In addition, we describe the diffusion process of the information systems playing an important role in this re-engineering process. The research question for this study is "How business process re-engineering changed our HRM process in organizing work in degree programmes?".

### 3 BUSINESS TRANSFORMATION

Blyth (1997) summarizes Dixon, Arnold et al. (1994) presentation of process development with a business transformation diagram. This diagram has five phases describing different levels of business transformation: process automation, process simplification/improvement, business process redesign/-engineering, business scope redesign and corporate transformation. First two levels of business transformation are categorized as continuous improvements. Last three are categorized as re-engineering focusing on changing the direction of the organization. Basically, we are talking about innovations in both contexts. Both re-engineering and continuous improvements require innovations. They both introduce a new idea, practice or some object to improve organization's performance and as we remember an innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption (Rogers 2003). In addition, we must remember that the organization's perception of the newness counts, rather than whether the idea or artefact is new to the world (Lyytinen and Rose 2003).

Organizations considering innovations go through the innovation-decision process (Figure 2). There are three different types of innovation-decisions in organizations. First, optional innovation decisions are decisions that an individual makes independently of the decisions by other members of a system. Second, collective innovation-decisions are choices that are made by consensus among the members of the system. Third, authority innovation decisions are decisions that are made by a relative few individuals in a system who possess certain status or position. (Rogers 2003)

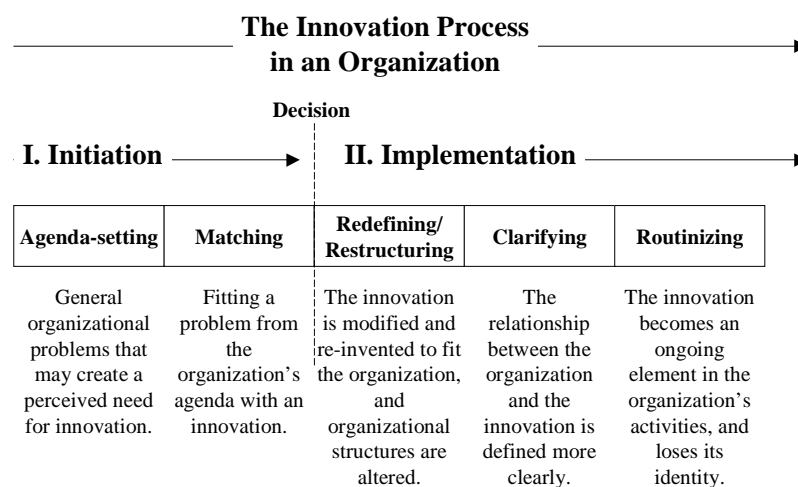


Figure 2. The innovation process in organizations (Rogers 2003).

The innovation process has two sub-processes: Initiation and Implementation. (Rogers 2003) The innovation process was originally described in (Zaltman, Duncan et al. 1973). The initiation sub-process is divided into two stages. The agenda-setting stage occurs when a general organizational problem is identified that creates a perceived need for an innovation. The term 'Performance gap' is used in describing this kind of problem and it is defined as the discrepancy between an organization's expectations and its actual performance. In the matching stage the organization identifies a problem and opts for an innovation to solve it. Redefining/restructuring occurs when the innovation is re-invented for the needs of the organization and it prepares for the innovation. In the clarifying stage the meaning of the new idea gradually becomes clearer to the organization's stakeholders. Finally, routinizing the innovation ensures that it becomes part of regular activities in the organization and it loses its separate identity. (Rogers 2003)

Achieving business transformation requires that the innovation is adopted and the processes are really changing. Above we saw the innovation process, but the properties of the innovation are important factors influencing the process progress. Rogers (1995) define five main attributes that influence adoption of these innovations (Table 1). The minus sign after 'Complexity' indicates that it has a negative influence on the adoption of the innovations.

Attribute	Description
Relative advantage	The degree to which an innovation is perceived as being better than its precursor.
Compatibility	The degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters.
Complexity (-)	The degree to which an innovation is perceived as being difficult to use. This is negatively related to the adoption rate of the innovation.
Observability	The degree to which the results of an innovation are observable to others.
Trialability	The degree to which an innovation may be experimented with before adoption.

*Table 1. Attributes of innovations influencing adoption (Rogers 1995).*

Since the innovations on this paper are information systems we study presentations concentrating on the adoption of these systems. One theory shows that other significant attributes influencing the acceptance of information technology are perceived usefulness and perceived ease of use (Davis 1989). The definition of perceived usefulness by Davis is quite similar to Rogers' definition of relative advantage: the degree to which a person believes that using a particular system would enhance his or her job performance. Rogers' definitions are based on the perceptions of the innovation itself and not on perceptions of actually using the innovation (Benbasat and Moore 1991). If potential users believe that a given application is useful, they may, at the same time, believe that the system is too hard to use and that the performance benefits of usage are outweighed by the effort of using the application. Thus usage is theorized to be influenced by perceived ease of use. (Davis 1989)

The IS success model by DeLone and McLean (1992) provides some useful tools helping with analysing information systems. The original model states that the organizational impact of an information system depends on the quality of the system and on the quality of the information. These influence the use of the system and users' satisfaction with it. A revisited model was presented in 2002, but the basic structure was almost the same (DeLone and

McLean 2002). There are also results that indicate that perceived system quality and perceived information quality are significant predictors of user satisfaction with the system, but not of system use (Iivari 2005).

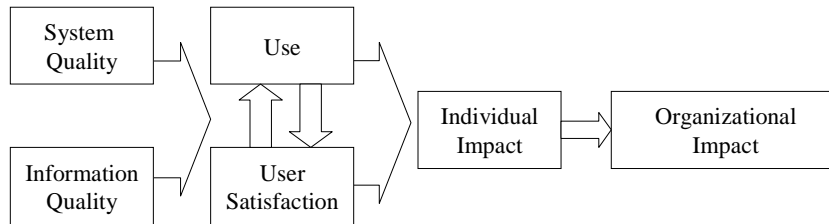


Figure 3. Model of information system success (DeLone and McLean 1992).

Furthermore, there are different classifications of factors affecting the implementation success of an information system. One model by (Lee and Kim 2007) classifies these factors into three classes: characteristics of the innovation (compatibility, relative advantage, complexity), organizational factors (customer interaction, top management support), and IS related factors (IS infrastructure, IS expertise, importance of IS security). Actually this classification approaches implementation success quite similarly as Rogers' (1995) diffusion of innovation presents innovation properties and adoption process. Research shows that it is crucial that a new information system is better as a whole compared the old one and this better means taking into account the distinctive features of the practitioners work (Kyhlbäck and Sutter 2006). Lyytinen (1987) classifies information system development process problems into six categories: goals, technology, economy, process features, view of organization and self-image. In addition, he provides a classification of IS use process problems (see Table 2). These problems correspond quite well with the properties attached to innovations in innovation adoption (Rogers 1995).

IS Problem Class	Description
IS operations problems	IS is difficult to use; interface is awkward; IS is slow and unreliable
Data problems	Data are incorrect; lacks relevance; is incomprehensible or missing
Conceptual problems	Wrong problem solved
People problems	Negative impact on work, power shifts and job qualification changes
Complexity problems	IS is too complex to understand, maintain and use

Table 2. The IS use process problems (Lyytinen 1987)

#### 4 ORIGINAL MANUAL PROCESS

The HRM process for organizing teaching is a very crucial process at the Turku University of Applied Sciences. This process has many stakeholders: the director of education, degree programme manager, teacher and payroll department. The results from this process are

delivery information of the curriculum, base data for time tables, a yearly working plan for teachers, cost adjustment into cost pools, and salaries for teachers. The yearly working plans are made for a calendar year, not for an academic year.

The process starts every year in August when the budget figures for next year are confirmed. Based on the budget the degree program manager plans the delivery of the curriculum for different study groups. At the same time, he plans other resources that will be allocated to teachers. Next step is to attach teachers to these courses and tasks like projects and tutoring. Based on this preliminary plan every teacher makes his yearly working plan containing also planned holidays. Before any information systems existed this was done using Excel-sheets that were printed, signed and sent to degree program manager for approval. If the plan needs modifications - like it use to do - teacher modifies the sheet, prints, signs, and sends it again. If the teacher works for some other degree program or for some project outside his own unit, the yearly working plan sheet is sent to the responsible person in question. In the next round, the yearly working plan (printed and signed by the teacher, DP manager and other responsible people) will go first to your own unit's director of education. He both signs the plan as well and sends it further or he returns it for modifications. If necessary the plan will be delivered to other directors of education for approval. Finally, the plan will be sent to payroll department for cost adjustment, salary computation and archiving. All this should be ready before the planned calendar year begins.

The above paragraph probably points out that the original process was very problematic, heavy and time-wasting. There was evident performance gap between this process and possible fluent and fast process. Major problems were

- a) the cycle of a working plan was too slow
- b) it was difficult to follow the cycle
- c) it was difficult to keep up with the updates of a working plan
- d) a lot of errors in cost adjustments
- e) data management was insufficient.

These problems initiated the innovation process and this situation can be seen as the agenda-setting phase. An idea of an information system answering above problems was presented and developed. The problems were matched with the future functions of the information system. Finally, the matching phase of the innovation process resulted in implementation.

## **5 PROCESS AUTOMATION - FIRST INFORMATION SYSTEM**

The new information system was built with Microsoft Access using client-server technology. The system was implemented in one campus and therefore only small portion of the university employees used the system. Now the organization was on redefining/restructuring phase of the innovation process. The information system was still under development and new features were introduced during the first months after the implementation.

The information system - called Tonni600 - provided assistance in cycling the working plans and it helped data management largely. For example, the system decreased errors relating cost adjustments and the reports were much clearer and easier to read than the old versions. However, the whole process was not automated. We still needed to print and sign the working plan reports. In addition, the plans were not moving to other locations of the university

electronically, rather internal mail delivery was needed. Although the system did not solve all the problems and actually raised more questions as well the innovation - the information system - established its role in the organization and was soon part of the routines in this HRM management process. The success drew attention from other locations, but the system was not implemented any other locations. Thus, this system never reached the clarifying phase of the innovation process. Actually, the technology used in the information system limited the usability and diffusion of the system. Nonetheless, this interest and the existing problems served as agenda-setting phase for a new innovation process. A new information system taking full advantage of the existing information system technology was needed. Once again the advances in technology are solving many of the IS problems (Lyytinen 1987).

The existing problems were

- a) it was difficult to keep up with the updates of a working plan
- b) who has the archiving responsibility of the printed and signed working plans
- c) cost adjustments needed still more accuracy
- d) the cycle of a working plan was too slow
- e) the usability of the system was limited to your own PC
- f) the data management capabilities of MS Access were not sufficient for a larger number of users.

Despite the problems, this information system improved the planning process, but we were not doing business process re-engineering rather process automation. An innovation process and actual business process re-engineering work started to build a new information system and to change the process better. A project called Tilipussi started in 2002 and a pilot version was introduced to plan the year 2004.

## **6 BUSINESS PROCESS RE-ENGINEERING - WEB-BASED INFORMATION SYSTEM**

The new information system was totally web-based written with Java Servlets and using Oracle database. The information system was at the core of our business process re-engineering. At the beginning new system was tested in one education unit (TELE), but it was soon adopted in HEALTH and TEB units as well. This new innovation was in the redefining/restructuring phase and many improvements were introduced in the system during the first year. A larger clarifying phase occurred in 2005 when the innovation was officially named as the tool where all working plans must be made. The decision was purely authority-based and raised of course some protests. However, this meant that our organization really took the step into a new re-engineered business process.

The new process improved and changed the way HRM process to organize teaching is now done. The whole process is now electronic, even a simple electronic signature is used. The cycle that used to take easily weeks or even months shortened in a couple of days. The process documents itself; every modification is stored in the database. Cost adjustments are better controlled and practically error-free. The whole process is easier to understand and the responsibilities are clearer. Technically, the work can be done everywhere and database capacity is not an issue.

Now the process is really a HRM process. The information system serves management better. The overall picture of the HRM process is now provided. We are now using coherent formats in working plans. The fairness of the personnel is easier to verify. This new process enables better reporting opportunities that have been lacking earlier. We now have a process that has solved the performance gap that existed in the original process and at the moment we are in the routinizing phase of the innovation process.

## 7 CONCLUDING REMARKS

The business process re-engineering we have realized has been very successful. The process has been quite long and as described the change has been stepwise. In every step the role of management has been very crucial and the decisions to go for the innovation have always been authority based. This presented case study confirms the ideas that top management support is one enabling factor for successful results in re-engineering and IS implementation (Dixon, Arnord et al. 1994; Olugbode, Richards et al. 2006; Lee and Kim 2007).

The process took quite long time and we agree the ideas of Lyytinen (1987) that IS problems can be removed by improving the IS development process structure. We agree that better management of our development process would have helped us to avoid at least some of the problems occurred during the process.

The innovation properties are important factors influencing the process. In every phase the relative advantage of the new innovation was clearly better than the previous way of doing things. Combatibility of the innovations has also been positive all the time. The presented innovations have been answers to existing problems and therefore the adoption of these innovations have been successful. However, some critical opinions have also been expressed and the need for the whole innovation has been questioned. Nevertheless, this is normal in the diffusion process. There are early adaptors and there are people who adapt it later. Complexity of the first innovation (Tonni600) was evidently slowing the adoption and actually was one of the reasons for a new innovation process resulting in Tilipussi information system. The complexity of Tilipussi is low and the system is easy to use and this has eased and assisted the quick adoption of the system. With both innovations, the observability has been very positive. For example in process automation phase the reports produced from the system made the system observable and helped diffusion of this system and furthermore supported the need for a more complete IS. Trialability was very poor with the first innovation, but with Tilipussi this question was handled much better; new users were trained properly and user support was organized. Altogether, we can say that it is no wonder that the business process re-engineering succeeded, because the innovation - the information system - was a success. Positive organizational impact (DeLone and McLean 1992) was actually a result of system and information quality resulting in high usage and user satisfaction.

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