"Business Process Reengineering as a Modernizing Tool for the Public Administration – From Theory to Reality"

Chalaris Ioannis Emmanouil
TEI of Athens
ixalaris@teiath.gr

Vlachopoulos Sotirios
Electrical Engineer
sotoshel@yahoo.gr

Abstract

In this paper, Business Process Reengineering is briefly analyzed in theoretical level. An effective methodology as well as Administration and Information Technology matters is described, while the differences to Total Quality Management are highlighted. Moreover, the phases of the BPMS methodology as well as reengineering techniques are explained. It is also presented how BPMS methodology is applied through the process management tool "ADONIS". For the application of the theory, the departments of Educational Institution of National School of Public Administration (NSPA) are reviewed while its operational processes are analytically studied.

Through the assistance of ADONIS tool, Process Modelling, Analysis and Simulation are carried out. The proper conclusions are reached, while new processes are suggested in the framework of process reengineering, mostly through the application of new blended learning technologies, like synchronous and asynchronous distant learning.

1. *Introduction*

Public Services, today more than ever, need to be citizen oriented, to respect but also to defend public resources and to take full advantage of technology. To fulfil these requirements, Public Administration needs to adopt new practices and tools which will contribute to the transformation of the Public sector and will be fully supported by technology [1].

A modern managerial approach should take into account the constant evolution of an organization at different levels. The proper management should, therefore, support the mission of an Organization through the evolutionary improvement but not via the inconsistency that rapid changes cause.

Business Process Management (BPM) aims at the above goal. It is a total managerial approach which aims at the governance of the process management environment through the improvement of flexibility and efficiency [2,3,4]. BPM is a structured administrative approach which uses methods, software tools, managerial principles and practices in order to constantly improve the processes of an organization. Additionally, the study of many best practices shows that BPM can lead the transformation and the automation of processes in Organizations that interact heavily with citizens facing serious problems at the level of service providing, like Local Administration Services, Urban Planning, etc [5].

2. *Business Process Management Systems*

The basic reason why Organizations invest in Information and Communication Technology (ICT) is that they seek increase in productivity. However, it has been proved [6] that there is no clear and proportional relationship between increase of investment in ICT and increase of productivity. This phenomenon is called "the productivity paradox". Hammer [7] considered this phenomenon from the business processes view and found that ICT were only used for the automation of existing processes, which were not properly designed to face the challenges of a contemporary, global and competitive economic environment, thus not leading to a desired increase of productivity. ICT were simply used for making some processes faster and not for producing innovation and quality, namely the fundamental requirements of the new environment.

Business Process Reengineering (BPR) was therefore suggested, having as a goal to optimize the value of the final products delivered to customers. ICT could help towards this direction by supporting the organizational changes and empowering the abilities of personnel so as to fulfill their duties.

According to Kerremans [3,4,8]:

- Orientation to processes complements but not substitutes orientation to operations.
- Processes should be not only efficient but also effective and transparent, concerning the operation of an Organization. This means that processes should be explicitly defined. It is clear that processes can not be

978-0-7695-3783-2/09 $26.00 © 2009 IEEE
DOI 10.1109/BCI.2009.41

fully automated to accomplish maximum efficiency, because there are parts in every process, where ICT plays minor role. The emphasis is given in coordination of different resources, such as people, documents, flows, policies, rules, decisions, which are involved in a process but not in the integration of a process into ICT applications, which aim at automation.

BPM supports the total life-cycle of a process. This cycle begins from the design and modeling, it is continued with parameter definition and beginning of the process and ends with evaluation-optimization. The life-cycle management is supported by a powerful technological base, which enables the effective management and automation of business processes. This is often accomplished by using special Information Systems, which are characterized as Business Process Management Systems (BPMS).

BPMS should have a three level architecture: user, process execution and applications integration. At two first levels, the respective tools and software elements are integrated, which support design, management, monitoring and execution of business processes. At third level, the way is presented, by which existing information systems are integrated, following the BPM logic. At this level the functionality of software applications, as a service independent of the technological background and platform, is significant to be taken into account. Moreover, a common communication channel is required, by which the messages for communication and management of these services will be transmitted. Finally, an architectural standard is needed so that systems be built that will integrate services and applications necessary to business processes. A programming language is also necessary for the configuration and the functionality of services as business processes. The most contemporary technological solutions for the above requirements are respectively the following: *web services, enterprise service bus, service oriented architecture and business process execution language.*

As far as applications integration is concerned, *Service Oriented Architectures (SOA)* are widely used. SOA is a development of component-based techniques, by which the effective alignment of managerial with technological dimension in an Organization is attempted. This is accomplished by a set of services based in SOA, which cater for business goals and support business processes [9]. BPM and SOA are not contradictory approaches but complementary [10]. Thus, BPM and SOA could be the next big wave in management, in a way that they are a win-win combination, enabling the total process management in an Organization.

At the level of practical implementation of BPM in Public Sector, there are many best practices internationally. The study of these practices shows that BPM can lead the transformation and the automation of processes in Organizations, which interact heavily with citizens facing serious problems at the level of service providing [1].

As far as research projects in Public Sector are concerned, the spearhead of research is the combination of BPM practices and technologies of "semantic web", aiming at the achievement of interoperability and "Cooperative Shared Knowledge" in future e-government systems. By this combination a new research field emerges, "Semantic Business Process Management", which may cause significant progress towards the direction of pan-European interoperable Public Services.

3. *BPMS methodology and ADONIS tool*

BPMS methodology (BPMS Paradigm [2]) offers a framework for the application of methods concerning BPM, which has been successfully applied by many European enterprises, mostly in German speaking countries (i.e FIDUCIA IT AG, Gothaer Allgemeine Versicherung AG, Magistrat der Stadt Graz, Vodafone Panafon S.A, Rheinische Postlagsgesellschaft mbH, Deutsche Bank AG, TUV Rheinland Holding AG) [11]. The main phases of the methodology are the following:

3.1. Strategic Decision Process

The goals and the quality criteria about the products and technological strategy, which organizational structure and processes have to support, are the basis for the strategic business decisions.

3.2. Reengineering Process

The target is the optimization of existing processes and designing new. First, the acquisition of information is carried out, then modeling, after that analysis of models and finally process reengineering. Reengineering is the heart of constant reorganizing and is carried out after the definition of goals from the "Strategic Decision Process". The result of reengineering process is the implementation of the new processes. There are two basic approaches, concerning the reengineering process: Revolutionary and Evolutionary.

- Revolutionary reengineering considers BPM as a fundamental rethinking and redesigning of the most important business processes. The result is major

improvements and countable changes, concerning cost, quality, service and time. Hammer [7] claims that measurement and examination of existing processes, which are going to be suspended, is useless, because creativity is limited, while resources and time are wasted.

- Evolutionary reengineering simply allows incremental improvements, like "Total Quality Management (TQM)", and is integrated by Davenport method [12], who considers measurement and examination of existing processes a very useful activity, which succeeds: realization of basis for change, determination of rules, laws and competences that affect service level, emerging of problems that have to be avoided in the new state, preparation for change, detection of the short-term improvement capabilities, establishment of a realistic base that can be applied in the "cost-benefit analysis" as well as in the "risk assessment".

3.3. Resource Allocation Process

This process applies to the desired new business processes designated by reengineering process, and incorporates both organizational and technological matters. The establishment of new technology may include the application of "Work Flow Management" and ERP Systems.

3.4. Workflow Process

Processes are executed in real environment.

3.5. Performance Evaluation Process

In order to be successful, reengineering has to be able to adapt to changing conditions. Through the execution of this process, data related to business processes are gathered and feedback the "Strategic Decision Process" as well as "Reengineering Process".

ADONIS is a tool for Process Management, developed by BOC, in cooperation with Vienna University. It is based to BPMS Paradigm [18]. It describes an overall process model for BPM, where from simple management we can proceed to reengineering of processes. The main tasks of a reengineering project include both organizational and technological matters, emphasizing to Optimization, Implementation and Project Management.

3.6. ADONIS tool

ADONIS includes five different standards or models.

a) **Process map**, which can be used as navigation assistance and as input for models hierarchy.
b) **Business process models**, which represent processes and organizational flows.
c) **Working Environment models**, which depict the organizational structure and are linked to executable processes, so that analysis, simulation and evaluation are accomplished.
d) **Document models**, which manage easily and coherently all documents involved in a process.
e) **Use case diagram**, in which the interaction of users with the system as well as the fulfillment of user requirements are depicted.

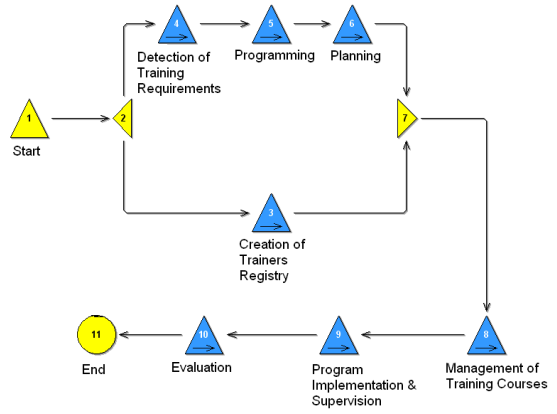
Through the implementation of these models (typical library of ADONIS platform), the application of BPMS methodology is feasible. However, the modification or the addition of some models may be necessary for the description of all particular characteristics of the application field.

4. *Case study: Improvement of business processes in Educational Institute*

NSPA Educational Institute aims at the training of both new appointed and already in service public servants, through specially designed short-term programs. These training programs aim at the understanding of the contemporary administrative reality and the new requirements that Public Sector faces. Their goals are also the adaptation of employees to the requirements of Public Administration in the new environment of Information Society. Educational Institute is organised in three administrative units and in one educational unit (divided in seven sectors). These units support the detection of training needs in Public Sector (planning, implementation & evaluation of training activities), offering backup to the administration. They use traditional training methods but introduce gradually ICT infrastructure. Most activities are supported by components of a specialized Information System or by using MS Office. For the future, a more active application of e-learning is desirable, which has to be incorporated in organizational improvements.

4.1. Modeling

The basic business processes were depicted and the functional processes, directly related to Business Processes Map, were analysed.



"Figure 1: Process Map of Educational Institute"

Detection of Training Requirements: definition of goals of the training process, assessment of real training needs.
Programming: assessment and selection of petitions, based on a set of criteria. The output is a list of the training programs.
Planning: development of an analytical training schedule and definition of training requirements, like classrooms and equipment.
Creation of Trainers Registry: it is based on specific criteria about qualifications of trainers.
Management of Training Courses: selection of trainees, assignment of classes, development of training material, management of classrooms and equipment.
Program Implementation and Supervision: data entry and supervision of training activities supported by the Information System.
Evaluation: assessment of participants in training process.

4.2. Analysis

In this phase, the processes that came from modeling process were further analyzed. First, a consistency check took place, aiming at the correction of errors. This check revealed errors related to activities like the following:

a) Attribution of performers to activities
b) Declaration of execution time
c) Detection of Objects of class "Start", whose frequency rate (per year/month/day) is not declared.

The analysis phase concerns the creation of questions over the functional process models. In this framework, typical and predefined questions were made, which resulted to useful conclusions, concerning the organizational units, performers, roles and times.

4.3. Simulation

In this phase, the processes were simulated by using three algorithms of ADONIS tool. These algorithms and some results are described here:

4.3.1. Path Analysis

This phase contributes to model evaluation, without the working environment (organizational structure) being taken into account. The execution of this algorithm over the entire model produces the total execution times as well as the cost.

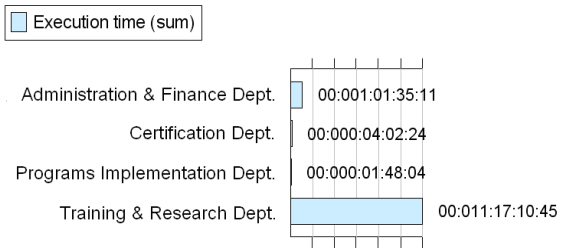
"Table 1: Total execution times"

	days	hours	minutes	seconds
Execution time	40	7	17	14
Waiting time	2	0	38	6
Resting time	6	3	47	11
Transport time	0	0	0	0
Cycle time	40	2	26	14

It can be referred that the sum of execution, waiting and resting times is approximately 48 days and 10 hours, while cycle-time is about 40 days and 2 hours. This practically means that the parallelism of several processes offers significant improvement to the total cycle-time of the model.

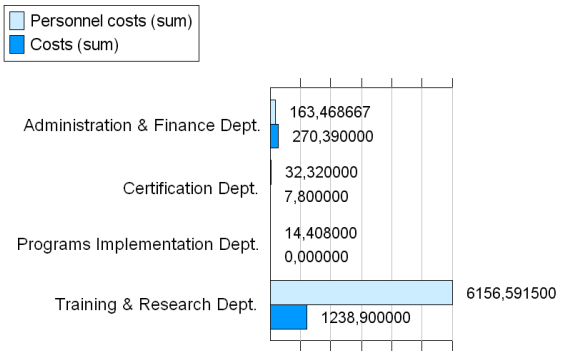
4.3.2. Capacity Analysis

This algorithm defines how many resources (performers and equipment) are needed based on how often these models are called in a specific time period. For the proper execution of this algorithm, it is necessary to define the frequency of each process. This number is a parameter of the object "Start" and can be expressed as frequency rate per year, month and day. The outcomes of this algorithm are shown in the following charts:



"Chart 1: Total execution times per Organizational unit"

It is obvious that the "Training & Research" department, wastes the greatest portion of time in comparison to the other departments. This outcome is due to the greater involvement of that department in the overall educational process, in contrast to the backup role of the rest.



"Chart 2: Total cost per Organizational unit"

The outcomes related to costs are similar to that concerning execution times. "Training & Research" department undertakes the greater cost in comparison to both personnel and operating cost. Another outcome of this algorithm is that the role "Participant to work groups" needs the highest time followed (in descending manner) by "Member of Evaluation Committee", "Scientific Officer", "Author", "Test Corrector", "Administration Officer".

It is clear that the activity "Evaluation of student petitions for participation in seminars" is time-consuming for Educational Institute. The detection of this disorder requires the reengineering of the whole student selection process.

4.3.3. Workload Analysis

This algorithm defines the waiting times and cycle-time of the models, based on a given quantity of resources and their availability. The execution of this algorithm results that "Certification Department" needs more personnel, because its processes are time-consuming. The "Training & Research" department follows, having the heavier work load, as it was shown in Capacity Analysis.

It is also concluded that the "Training & Research" department undertakes the greater operating cost, while "Certification" department undertakes the greater personnel cost per "resource unit". This means that a more balanced cost allocation among departments is necessary.

Furthermore, it can be concluded that:

- There is a heavy work load on the "Scientific Officer" and "Administration employees".
- Personnel cost burdens the same roles.
- Operating cost is almost totally attributed to "Scientific Officer".

All above conclusions are very useful, because they reveal disorders, having to do with execution times, costs and allocation of work load.

5. *Process Reengineering in Educational Institute*

The implementation and management of a great number of training courses that will enable Public Administration to take advantage of infrastructure but also to accomplish the establishment of the e-government model, is a significant challenge for National School of Public Administration. However, the real challenge has to do with the establishment of a life-long learning model for the education of Public Administration Officers.

This model could be based on a contemporary Learning Content Management System (LCMS). NSPA uses an Information System that covers its multiple administrative and educational needs. It also owns an adequate infrastructure for an LCMS implementation. Additionally, NSPA has taken into account the potential establishment of an Educational Process Management Information System, which is classified in the category of specialized LCMS applications.

The implementation phases of blended learning model (educational requirements analysis, training schedule and material, evaluation and certification) are based on specialized LCMS. However, the implementation of a blended learning model requires:

- Process reengineering of the overall training cycle.
- Development of technological infrastructure and adaptation to the predefined processes.

- Design of proper training material.

6. *Conclusions*

BPM is the most ambitious effort for the enhancement of operations by advanced Information Systems. The success of a BPM initiative leads to a paradigm change in an Organization, transforming it from being operation-focused to process-focused.
BPM is based on a constantly growing technological infrastructure, aiming at the interoperability of Information Systems, the cohesive view of information, the integration of old and new web-services-based systems and the flexible design of solutions and services towards customers.

BPM adoption to Public Administration is not an easy matter but an everlasting challenge for every Organization, leading it to face the profound reasons of its malfunctions. From this point of view, BPM should be in the core of an overall reform strategy that will guide and coordinate these transformation efforts.

Reengineering requires the culture change of an Organization. The decisions are taken by the work groups themselves and, thus, fewer managers are needed. The managers are responsible for the proper design of processes, without controlling people who work independently.

ADONIS tool describes, through its various models, both operational processes and structure of an Organization, offering a base for its analysis. As it was shown by case study, modelling, analysis and simulation reveal the functional problems and pathologies of an Organization, namely the detection of time-wasting processes, bottlenecks and personnel allocation problems. The next step is either the improvement of existing processes or reengineering, according to the strategy.

In this article, reengineering techniques of existing processes in Educational Institute were presented. Modelling offers a base for further analysis of new processes, which integrate the blended learning model through distant learning. It is clear that the implementation of new technology, which enables the transition from traditional to blended-learning model, contributes to the increase of effectiveness as well as to the better performance of human and material resources.

This article is a value-added effort especially in Greece, where all reengineering pilot-projects have failed due to resistance to change and lack of know-how. This methodology approach is extremely useful for a number of reengineering projects that will be implemented in the framework of co-financed Operational Program "Public Administration Reform" of National Strategic Reference Framework.

7. *References*

1. **I. Apostolakis, E. Loukis, I. Chalaris,** E-government-Management, Technology, Applications, Papazisis edition 2008
2. **BOC – Prof. Dr. Karagiannis et al**, Adonis Version 3.81, Volume 3, Method Manual, Adonis Standard Method, 2005
3. **Kerremans**, M. (2007). BPM Technology: From Best-of-Breed Tools to Process, Gartner.
4. **Kerremans**, M. (2007). BPM: A Change From Business as Usual, Gartner.
5. **A. Chantzis,** Adoption Possibilities of Business Processes Management Methodologies in Greek Public Administration, National School of Public Administration, 18th Class
6. **Brynjolfsson, E**. (1993). "The productivity paradox of information technology." Commun. ACM **36**(12): 66-77
7. **Hammer**, M., Reengineering Work: Don't Automate, Obliterate!, Harvard Business Review, Nr. July-August, 1990, S. 104-112
8. **Kerremans**, M. (2007). Process Modelling for Profit, Gartner.
9. **Arsanjani, A., B. Borges, et al**. (2004). "Service-Oriented Architecture Components and modelling can make the difference." Web Services Journal
10. **Fingar, P**. (2008). Extreme Competition, BP Trends
11. **Strategic Meeting Partner BOC AG**, Wien 2006, 2007 2008
12. **Davenport**, T. H., Process Innovation - Re-engineering Work through Information Technology, Harvard Business School Press, Boston 1993
13. **Davenport**, T.H., Need radical innovation and continuous improvement? Integrate process reengineering and TQM, Planning Review, Vol.21 Iss. 3, May/June 1993
14. **EPIS** Information & Communication Systems (2007), Study: Business Processes of National School of Public Administration, Athens 2007
15. **Guha**, S.; **Kettinger**, W.J. & **Teng**, T.C., Business Process Reengineering: Building a Comprehensive Methodology, Information Systems Management, Summer 1993
16. **Hammer**, M., **Champy**, J., Reengineering the Corporation - A Manifesto for Business Revolution, Harper Collins Publishers, New York, 1993
17. **Zachman**, J.A., A Framework for Information Systems Architecture, IBM Systems Journal, Vol. 26, No. 3
18. **Web site of National School of Public Administration**, www.ekdd.gr
19. **Web site www.boc-eu.com**