

RE-ENGINEERING THE KNOWLEDGE MANAGEMENT PROCESS. THE CASE OF THE UNIVERSITY COLLEGE OF ENGINEERING

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Abstract. This paper describes the Re-engineering applied to a process entitled "Knowledge management KMP" pertaining to a University College of Engineering. The principles of process re-engineering are applied to an organization managed by processes according to the EFQM -European Foundation Quality Model- in order to increase its efficiency. Specifically, we worked by following the steps within an improvement cycle called CMP (Business Process Improvement Cycle) and by using a value analysis tool to quantify its value and improve efficiency.

Keywords: re-engineering, knowledge management, business process management, engineering higher education, innovation

1. Introduction

The road to management excellence for the University College of Engineering entails acceptance of the EFQM (European Foundation for Quality Management) model as a benchmark to be followed. Such that, in 2006, the UCE, Vitoria, achieved the silver award, which is credited with 400 points, plus 4 star recognition for excellence in advancing this European model of excellence. Within this model, knowledge management is a principle or key element to management as stated explicitly in the EFQM Excellence Model within its "People" and "Partnerships and Resources" criteria [1].

The UCE, with 120 employees, is managed with an approach based on the following axioms:

- The mission of the College must be to "create value for its customers". The customer is an engineering degree student and whose satisfaction should be a consequence of value creation and proper management;
- Processes should be geared toward student satisfaction;
- Value is created by the employees who contribute to the efficiency of the processes
- and, finally, improving the efficiency of the processes will ensure greater value supplied by the College.

Information and Knowledge Management is a complex process within a university structure, especially when applied to an organization that generates knowledge, as is the case with the

University College. This complexity is reflected in the existence of an information and knowledge management procedure (PP/009) aimed at defining and structuring both internal and external information resources and their users.

However, given its broad range, this has little bearing on the manner or means of undertaking the said knowledge management. This makes it difficult to measure the efficiency of data gathering operations or the dissemination of information or knowledge and planning of subsequent improvement measures. While reviewing continuous improvement measures, the need for a substantial redesign was detected. In particular, the need to introduce changes to activities within the process and its progression in order to achieve significant improvements in the efficiency of how it performs. In order to establish other references, existing literature has been reviewed, studying cases of successful improvements centred around university organizations such as that expressed in De Bruyn [2] and the K.U. of Leuven.

In order to address this change, the principles of process reengineering, Hammer [3] have been adopted. Likewise, methodologies such as those described in Argote et al [4] Davenport et al [5] Humphreys [6] Massey [7] Papinniemi [8] and Shu-hsien [9] have been studied.

Similarly, several reengineering methods, having been well summarised in Grover [10] and adapted to Spanish culture in Perez [11], have also

been studied. For the purposes of following a process reengineering methodology, the CMP (Business Process Improvement cycle) registered to the University of Navarre, as described by Berenguer [12], has been considered as the most appropriate methodology for redesigning the Information and Knowledge Management process, given that, in addition to being less invasive than those methodologies that emphasise re-engineering, it integrates the perspective of the business process with the implementation of information systems, ensuring the effectiveness of the improvement measures and the success of the project [13].

2. The CMP process improvement cycle and its application to knowledge management in a University Centre

The process improvement cycle, referred to as CMP, consists of eight phases which can be broken down into 29 activities and 122 tasks. A classic cycle of problem solving applied to improving business processes will consist of five phases (identification, modelling As-is, To-be improvement, implementation and control). The CMP also adds: a stage of awareness designed to prepare a situation of change favourable to the organization's new paradigm; an identification phase which responds to the question "What is the first process that should be improved in view of the company's strategy?"; and a final training phase for the organization and its human resources to guarantee the crystallization of the process culture [2].

The objectives to be achieved upon completion of the process improvement project are:

- Efficiently perform all activities related to information and knowledge management, relevant to the excellent performance for the Engineering College, namely: generation, research, dissemination, sharing, use and updating.
- Cater to the information and knowledge needs of the remaining management processes: planning, measurement and analysis, improvement management, teaching-learning and support processes.

The results of the developments implemented are given below.

2.1. First step. Compilation and analysis of the current situation (As-Is).

The information and knowledge management process has been formally described in two documents and/or procedures; one bearing the same name and one called the communication process at the centre. The latter refers to the dissemination of the knowledge output from the centre.

The contents of both documents are laid out as follows:

a) Procedure for managing information and knowledge

a.1.) Information Resources for the UCE.

- Information from external sources
- Information management relevant to the processes
- Information resources used to disseminate the documents produced by the centre

a.2.) Relevant knowledge management

- With regard to planning processes
- With regard to measurement and analysis processes
- With regard to improvement management processes
- With regard to teaching-learning processes
- With regard to support processes

b) Procedure for the communication process at the centre

b.1.) General communication for staff at the centre.

- Transmission of information from management to other staff

By way of a first step, the general outline of the processes has been analysed and changes made to avoid any superimposition and/or duplication among procedures. In addition to unifying the information into a single procedure, and with the aim of objectively and quantitatively improving the current situation, the decision was made to apply the technique of value analysis for the activities and tasks that go to form the current process.

2.2. Second step. Application of Value Added Analysis

The technique of value-added analysis of activities and tasks is routinely used in the analysis phase of CMP, more specifically in the "Identify" activity, the aim being to identify deficiencies within the process by performing a thorough analysis of it. Essentially this analysis is based on dividing the process into work units: activities and tasks, as small as possible, but ensuring that they retain their significance.

For purpose of this document, it was decided to proceed with a detailed examination of the activities within one of the sub-processes and then continue with the rest of the sub-processes and expand the work. The purpose of the analysis is to optimise the tasks provide added value and minimise or eliminate those that do not contribute value.

With regard to the value that an activity or task adds, this will be classified as V: adding value to the customer or true value. VE: adding value to the company, differentiated between VE-G: adding value to the company because it intervenes in management processes and VE-S: adding value to the company because it intervenes in support processes: Lastly, C: an activity or task that does not add value.

To denote the activities and tasks a Resource-Action-Object (RAO) model has been used, and this consists in constructing short phrases that designate activities and tasks indicating, in this order: who is performing the activity or task (resource), the operation that is being performed (action) and who is the oblige of the action (object).

The activities were then determined, as well as their breakdown into tasks and subtasks

following, for purposes of naming or a brief description, the aforementioned model. After this, the following were determined: the processing time or cycle time of the activity or task and the running time or amount of time actually spent working on the output. The difference between the process time and the running time will be due to factors such as preparation, delays or downtime. In order to calculate these times experts in statistical estimations were consulted.

Next, the subtasks that do not contribute value were identified, resulting in a laboriously complicated process. The majority of activities detected that did not provide value were due to deficiencies or errors in the process, or those that were duplicated in another organizational unit (process) or which added unnecessary steps to the process or in response to requests from a dissatisfied customer.

Finally, the total process times were added together along with the times of tasks that do add value, proving that only 34.71% of the tasks added value to the information dissemination sub-processes. Table 1 shows a summary of the analysis applied to the information dissemination sub-process at an Activity level.

¶ Table 1. Analysis of added value for Sub-Process 3. Dissemination of information to interest groups - Breakdown at activity/task level.

Task	Name	Kind of activity	Process Time (minutes)	Running time (Minutes)	Value Task Time (Minute)
	(Resource- action –object)	V: Customer Value VE: Company value S: Support G: Management C: No Value			
Sub- Process 3.-Dissemination of information to interest groups - Breakdown at activity/task level.					
Activity 1. Dissemination of Information to the staff group of UCE to make their jobs			675	325	235
1	Call School Board - Secretary produces and disseminates the call -Call staff	VE-G	130	65	65
2	Draft a statement of School Board and its Extracts - Secretariat prepares and disseminates reports and extracts that contain all the facts, data and information relevant to the management of it-- Notify the Staff	VE- G	205	145	125
3	Delivery schedules of teaching for teachers - Vice-dean publish and distribute via the web and intranet -Known to the teacher planning work	VE - G	210	80	10

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Task	Name	Kind of activity V: Customer Value VE: Company value S: Support G: Management C: No Value	Process Time (minutes)	Running time (Minutes)	Value Task Time (Minute)
4	Announcements and organizational communications - Deans communicate by email address or directly to staff - Dissemination to all the personnel	VE- G	130	35	35
Activity 2. Dissemination of information to the students group			707	307	272
5	Academic offer- Spread to the students through the web, editing a paper document - Dissemination of academic offer	V	167	52	22
6	Notes, memos--Professor publishes information on its platform or learning in the academic system (automated) - Communication to students	V	180	90	90
7	Vice-Dean for Enterprises manage workplacements offer- Spread workplacement in the noticeboard, or customer-direct - Dissemination of workplacement possibilities	V	205	105	100
8	Offer of Finnal projects- Vice-dean prepares and distributes bid list projects: direct (board), meetings, in writing - Dissemination of projects to students	V	15	5	5
9	Planning examinations dates- Vice- dean publish and distribute web -Publish the dates and locations for the examinations	V	20	10	10
10	Administration published notices concerning to the students such as convalidations, regulatories- Print and publishes on board or direct - Publish these administrative events	V	30	15	15
11	Offers of academic exchange programs- Vice- dean for International relations publishes on board, briefings, meetings- To inform the students can apply for them	V	90	30	30
Activity 3. Dissemination of information to external groups of interest			370	95	95
12	Academic Report (including financial report) - Distribution and dissemination to staff and interest groups- Publish the achievements and successes of the previous year	VE- S	370	95	95
Activity 4. Dissemination of information to keep the management of the university			40	20	20
13	Scoreboard with indicators- Annual review- Know the management evolution and trends	VE-G	20	10	10
14	Mission- Vision, Strategic Plan, Management - Elaboration - Operation of the excellent management of the center	VE- G	20	10	10
			1792		622
Added Value (%):		34.71%			

2.3. Third step. Redesign of the To be process-document

Based on the analysis results of the current situation (duplications, overlaps ...) provided by the Analysis of Added Value and conclusions obtained regarding the total time of the tasks that add 34.71% value, it has been possible to quantify the value of the process for the customer. From this point onward the improvements can be initiated;

eliminating tasks that do not add value, such as unnecessary controls, and rearranging activities with the aim of eliminating duplicity. All of this involves redesigning the process, gearing it towards the customer's needs. Shown below, in Figure 1, an outline of the new information and knowledge management process.

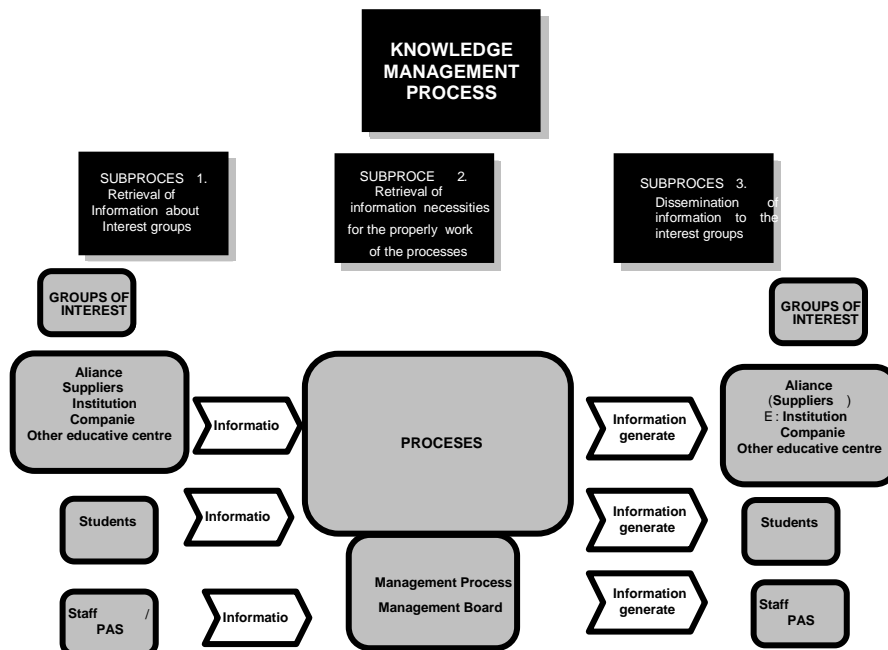


Figure 1. Redesign of the information and knowledge management process

3. Conclusions

Process management and the European Foundation for Quality Management model represent the benchmark for advancing towards excellence in management. University College of engineering excellence has been ratified by obtaining more than 400 points, corresponding to the silver Q award, through independent external evaluators. Nonetheless, the implementation of a process driven organization is still ongoing, as is the process of continuous improvement.

While it is true that when an organization has introduced this model it is then much easier to apply a program of incremental reengineering to enhance the effectiveness of its processes, given that it has already learned to identify the customer's needs and analyse the basic processes. Several conclusions can be drawn from the experience of improving an extensive information and knowledge management process

- The first conclusion we can formulate as follows: The proper design of processes depends on the ability of an organization to improve its quality.
- The process is the point of accord for: eliminating defects, increasing efficiency and capacity, to reduce time and increase productivity.
- We can also state that the CMP (process improvement cycle) methodology helps the organization to manage continuous improvement procedures. The methodology can steer the improvement without straying off into other ancillary and/or supplementary tasks.
- Quality is focused on continuously creating value for the customer, and application of the Value Analysis tool allows this value to be quantified. Once quantified, the process can then be cleaned, eliminating or reducing those tasks that do not add value by increasing their effectiveness and consequently raising their value indicator.

From these conclusions, the management team at the centre feels that, at some future point, the methodology described here will be extended throughout the entire information and knowledge management process for the University College of Engineering, Vitoria-Gasteiz, Spain.

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