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## Business Process Modeling in Higher Education Institutions. Developing a Framework for Total Quality Management at Institutional Level

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### Abstract

This article presents a stage of a quality management model in higher education institutions based on business process modelling. The paper points out the importance of graduates' satisfaction in assessing quality in universities and looks at a key development, that have shaped the idea of correlating the graduates' requirements regarding the developed specific and transversal competencies during the study with the required competences in the labor market. On the basis of the existing literature evidence and on the performed results, the paper proposes a business process management model by outlining the importance of understanding graduates' requirements, their needs and expectations.

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### 1. Introduction

The importance of education for the development of excellence and knowledge contributes directly to the social and economic development of a country. Ensuring the development in this direction involves understanding the mechanisms, which underlines the processes of strengthening academic quality assurance and improvement, but also the existence of a good strategy to achieve the performance. The aim of the research is on the one hand to identify the main characteristic issues of quality in higher education by highlighting the graduates' perception about the developed

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specific and transversal competencies during the study and their utility on the labor market and on the other hand to develop a framework for implementing a quality management model in higher education institutions based on business process management modeling. The success of a university depends on its ability to ensure the necessary resources to achieve the main objective, which refers to the provision of knowledge and skills embodied in people and technologies. The value of such knowledge is defined by the stakeholders of the universities in terms such as quality, relevance or utility.

## **2. Material and Method**

The key component for the quality assurance in the European Higher Education Area is the evaluation and the accreditation process. There are two types of quality evaluation process in higher education institutions: the external and the internal evaluation. It is remarkable that, the external evaluation is based on the internal evaluation mechanisms and do not illustrate the aspects related to the students'/ graduates' feedback. The quality assessment through internal evaluation includes aspects regarding teaching and research quality, teachers' performance, students'/ graduates' competencies and abilities as well as the curriculums' structure and graduates' level of employability (Harvey, 2002).

This article presents the essential quality dimensions in higher education institutions by means of the internal evaluation made by the graduates. Understanding and promoting graduates' satisfaction brings numerous benefits for the universities (Hartman and Schmidt, 1995). There are several studies related to the graduates' satisfaction with their overall higher education experience. Palti et al (1993, quoted in Garcia –Aracil, 2009) examined the link between student retention and student satisfaction with the educational service facilities and performance. The authors illustrated that the career advice services could help student retention and graduates satisfaction. A study made by Stwine and Alves (2010) in Sweden and Portugal revealed that a big challenge seems to be how to meet expectations and demands on young adults, that have "invested" in tertiary education. Lafuente et al. (2012) analyzed the relationship between graduates' satisfaction with higher education and graduates' expectation regarding their employment status in Spain. The results showed that the less satisfied graduates were those who studied the longest and the ones showing less employment and job relatedness. The perception of quality performed by graduates is conditioned by the fulfillment of their own expectation regarding to what the higher education institution can provide to them ( facilities, teaching) and on what they can acquire by themselves (academic performance, social contacts) (Lafuente et al., 2012). Analyzing the perception of quality by former students are a valuable feedback, because taking into account their experience in the higher education institution reveals the actual correlation between their acquired skills and the one needed to their job (Tam, 2001).

This paper highlights the graduates' satisfaction regarding the developed specific and transversal competencies during the study by correlating these with their utility on the labor market. Further, in order to asses a continuous development of the quality referring to the graduates' satisfaction with the provided knowledge and transversal competencies, the business process modeling is used. Business Process Management is actually form this point of view a provider of tools and techniques to efficiently manage business processes (Huang, 2011). Antune and Mourão (2011, quoted in Anand, Wamba and Gnanzou, 2013) admits that BPM is a collection of technologies capable of translating business process models into computer-supported activities, while Pyon, Woo, and Park (2011, quoted in Anand, Wamba and Gnanzou, 2013) illustrates BMP as being a system which supports business processes using methods, techniques, and software to design, enact, control and analyze operational processes involving humans, organization, applications, documents and other sources of information.

The adoption of business process improvement strategies and business process modelling in higher education institutions is a sign that universities want to perform functions and to develop procedures in order to fulfill the expectations of the customers. From this point of view, an identified, documented, standardized, managed and automatized business processes ensure them to stay competitive on the market and in the same time allows them to meet the customer requirements. Further, by using business process modeling in higher education institutions would help universities to develop a general framework for the continuous quality management model based on graduates' feedback seen as an output of the educational services, because increased competition in higher education sector determine universities to use the graduates' satisfaction as a quality sign.

### 3. Experimental

The contribution of this work is to try to find measures of satisfaction among the graduates and the business process modeling method could help universities to establish the customer oriented marketing strategies that are needed one the one hand, due to increased competition in this sector and on the other hand due to the actual trend in the educational sector, which refers to increasing graduates' employability. In order to measure the graduates' satisfaction a questionnaire was developed and administered to 103 graduates in the economic field (German line) within the Faculty of Economics and Business Administration (N = 102), having a response rate of 22,6%. The pilot study included a total of 25 students, and took place in the initial phase of the research. Some of the items were reworded, but most of the items were retained. The questionnaire is based on six dimensions concerning: information about the graduated study program (qualitative information); information about internships completed during the study (qualitative information); information about the quality of graduated study program and about the developed competencies and abilities during the study (quantitative information, five-point Likert Scale); information about the graduates' employment status (qualitative information and quantitative information, five-point Likert Scale); information about future events dedicated to Alumni/ Graduates and socio – demographic information.

Actually, so that a quality management model bases on business process modeling could be developed, the authors took into consideration the questionnaire section regarding information about the developed specific and transversal competencies during the study (quantitative information, five – point Likert Scale) (Appendix 1). Then, in order to develop a quality management model by bringing to the fore the graduates' satisfaction regarding the developed specific and transversal competencies, the paper presents two separate areas of quality: quality assurance (developed specific and transversal competencies during the study) and continuous quality improvement (the utility of specific and transversal competencies on the labor market). Calculations are processed using SPSS for Windows, and by means of a paired samples t test - will be highlighted significant differences between the two above mentioned quality areas. These differences will be integrated and outlined in a quality management model based on business process management principles (modeling).

### 4. Results and Discussions

In order to obtain the above mentioned quality management model, we have developed a general framework around the definition that a business process model describes the means and methods a company uses to reach its profitability (Harrington et al., 1997). In the case of a Higher Education Institution, its profitability is a more complex subject and along with the material aspects of sustainability and growth of the institution, it also involves a high level of quality in the teaching process. In this regard, our model will include the activities and their ways of realization, the efficient use of resources towards obtaining the main goal, correlated with the specific points of those activities that will lead to a high quality level for the teaching process. The advantages offered by BPM involve an easy way of collaboration with various management practices, like the management of human resources or the performance management, key points to a model for Higher Educations that focuses on total quality management.

According to Thom (2009), the three "P's" of a managerial process are: People Management, Process Management and Performance Management. Relating the three "P's" with the issue of quality management evaluation, we have reached to the following framework (Figure 1):

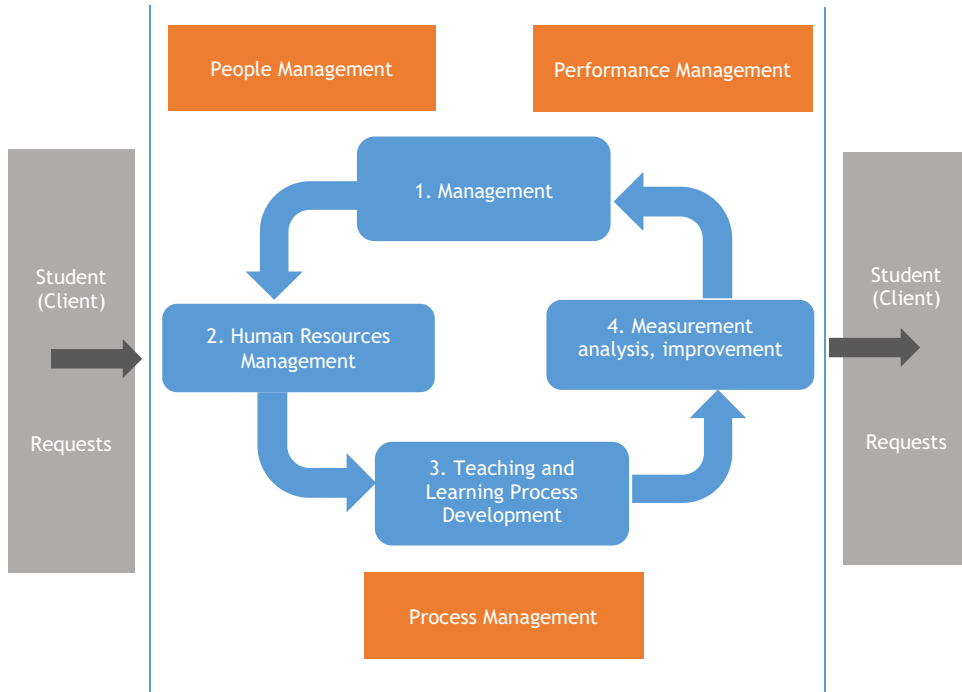


Figure 1. A Framework for Higher Education Processes

As Chevallier (2002) Duarte and Martines (2011), we consider students as clients of a university that have demands and expectations, generally named in our framework as requests or inputs. They involve in the educational process out of which they obtain a certain satisfaction that will be considered our output. On a general level, this educational process is determined by the three "P's" and involves a general management system defined by policies and objectives also at the top-level administrative structure. On the next level, we have the Human Resources Management involving the personnel with knowledge training and competencies, the working environment and infrastructure and will be evaluated on the levels of teaching and research (we have taken into consideration only the personnel involved in the teaching process – as it directly influences the outputs of students). The teaching and learning process involves the management of curricula, accreditation of specializations, courses creation and development and post-learning assistance. This level allows a deeper and more specific evaluation that we will take into consideration. Thus, all of the above mentioned levels conduct to a level of measurement, analysis and improvement that will highlight elements like: internal auditing, the student’s satisfaction and monitoring/ measurement of processes and services (courses, trainings and skills).

Further, we have focused our study on teaching and learning process evaluation. As mentioned before, the questionnaire was addressed to alumni and it allowed us to measure two dimensions: quality assurance and continuous quality improvement. These two dimensions were applied to measure 14 abilities and competencies that the German studies specializations is currently offering to students (Appendix 1). We have considered that each pair Current Development / Desired Utility can represent a set of requests / results for the process of Teaching Evaluation. Current Development shows the level of satisfaction currently obtained by students and represents the satisfaction of our clients (Results) and Desired Utility represents the necessary level to be reached by a the given ability/competence in order to be effective (the utility of specific and transversal competencies on the labor market) and a future improvement request for the educational system.

The paired samples t test illustrated in Table 1 highlights that there are differences in terms of means belonging to the quality areas: quality assurance (specific and transversal competencies developed during the study) and continuous quality improvement (the utility of specific and transversal competencies on the labor market). This situation reveals a predictable variable for assessing a continuous quality management model based on the business process

management principles, namely based on modeling. Each pair from 1 to 14 contains the mean values obtained for each of the above mentioned areas: quality assurance – marked in our table with Development and continuous quality improvement – marked with Utility.

Table 1: Paired Samples Statistics

In addition, we have assumed that any difference higher or equal to 1 in the mean values of any pair

Paired Samples Statistics				
		Mean	Std. Deviation	Std. Error Mean
Competence 1	<b>Development:</b> Knowledge of basic investigative methods specific to market economy	<b>3.2255</b>	.85489	.08465
	<b>Utility:</b> Knowledge of basic investigative methods specific to market economy	<b>3.6863</b>	1.11675	.11057
Competence 2	<b>Development:</b> Explanation and interpretation of specific processes of economic activities	<b>3.3039</b>	.84184	.08335
	<b>Utility:</b> Explanation and interpretation of specific processes of economic activities	<b>3.7157</b>	.95831	.09489
Competence 3	<b>Development:</b> The ability to view, interpret and apply rules and regulations in the economic and social field	<b>3.1275</b>	.96135	.09519
	<b>Utility:</b> The ability to view, interpret and apply rules and regulations in the economic and social field	<b>3.7843</b>	1.11362	.11026
Competence 4	<b>Development:</b> Use of specific technology and tools in the economic and social activities	<b>3.0490</b>	1.00865	.09987
	<b>Utility:</b> Use of specific technology and tools in the economic and social activities	<b>3.8627</b>	1.10838	.10975
Competence 5	<b>Development:</b> Data collection, processing and analysis for decision making processes	<b>3.1961</b>	.91239	.09034
	<b>Utility:</b> Data collection, processing and analysis for decision making processes	<b>3.9902</b>	1.03880	.10286
Competence 6	<b>Development:</b> Ability to work in complex and multicultural teams	<b>3.4216</b>	1.12959	.11185
	<b>Utility:</b> Ability to work in complex and multicultural teams	<b>4.3627</b>	.88764	.08789
Competence 7	<b>Development:</b> Business initiation and development in the global economy	<b>3.0196</b>	1.05286	.10425
	<b>Utility:</b> Business initiation and development in the global economy	<b>3.7941</b>	1.14614	.11348
Competence 8	<b>Development:</b> Supporting management activity through studies, summaries and forecasts at micro and macro level	<b>3.0098</b>	1.03880	.10286
	<b>Utility:</b> Supporting management activity through studies, summaries and forecasts at micro and macro level	<b>3.5784</b>	1.14698	.11357
Competence 9	<b>Development:</b> Effective communication (in German / English) and effective conducting comparative of studies in the area of business	<b>3.5686</b>	1.10364	.10928
	<b>Utility:</b> Effective communication (in German / English) and effective conducting comparative of studies in the area of business	<b>4.2549</b>	.88649	.08778
Competence 10	<b>Development:</b> Ability to effectively manage working time	<b>3.0490</b>	1.23783	.12256
	<b>Utility:</b> Ability to effectively manage working time	<b>4.2941</b>	1.05856	.10481
Competence 11	<b>Development:</b> Rhetorical and presentation skills	<b>3.2255</b>	1.17656	.11650
	<b>Utility:</b> Rhetorical and presentation skills	<b>4.1275</b>	1.17458	.11630
Competence 12	<b>Development:</b> Ability to mobilize others	<b>2.9020</b>	1.14762	.11363
	<b>Utility:</b> Ability to mobilize others	<b>4.0980</b>	1.04843	.10381
Competence 13	<b>Development:</b> Critical thinking	<b>3.1961</b>	1.14355	.11323
	<b>Utility:</b> Critical thinking	<b>4.1373</b>	1.06277	.10523
Competence 14	<b>Development:</b> Analytical thinking	<b>3.3039</b>	1.16712	.11556
	<b>Utility:</b> Analytical thinking	<b>4.3922</b>	.84615	.08378

Development/Utility would signify a gap between inputs and results, more precisely between present value and the desired value, if taking into account the labor market opinion. The justification for the precise value of 1 point is given by the scale used in the questionnaire. For example a mean value of 3 for the Development indicator would signify a fair development of the given ability/competence and a mean value of 4 for Utility would signify that ability is more important.

Taking as example the results obtained for Pair 10 we have observed a difference of more than 1 point between the Development mean and Utility mean. This difference is actually suggesting that at the moment students consider that they obtain a fair ability of time management, but in the working field this ability may be more important, as it was noted with a mean value over 4. In such case an improvement for the given ability – Time Management is necessary to keep the curricula updated to the demands of the labor market.

Another aspect to be taken into consideration is the difference between specific and transversal abilities. Specific abilities or competencies are associated inside curricula with certain courses offered, whereas transversal ones are

developed throughout the whole program of study without being associated with a certain course. Transversal abilities and competencies may be associated only with certain specific abilities or competencies and in extent with certain courses. Such an association has allowed us to identify groups of specific and transversal abilities/competencies connected to each other, in order to have a clearer image of the courses that need improvement. Table 2 shows the specific abilities and competencies taken into consideration in our questionnaire and the associated transversal abilities/competencies.

Table 2: Specific and transversal competencies

Specific Abilities / Competencies	Associated transversal competencies
Competence 1	Competence 13, 14
Competence 2	Competence 9, 13, 14
Competence 3	Competence 13,14
Competence 4	Competence 10, 13, 14
Competence 5	Competence 10, 13, 14
Competence 6	Competence 9,10,11,12
Competence 7	Competence 9,10,11,12
Competence 8	Competence 13, 14

Moreover, we have developed two scenarios that may lead to course improvement:

Scenario 1: If a specific competence is identified as having a gap of more than 1 point between mean values of Utility and Development a suggestion of improvement is sent for those courses that offer the given competence according to curricula.

Scenario 2: When a transversal competence is identified as having a gap of more than 1 point between mean values of Utility and Development, we take into consideration the associated specific competencies which lead to identification of courses that may develop indirectly the given transversal competence. To those courses a suggestion of improvement is sent in order to emphasize the transversal competence identified above. Taking into consideration these scenarios we have developed a model for Higher Educations that focuses on continuous improvement, as a basic condition for Total Quality Management in teaching processes by using ADONIS:Community Edition, as tool for modeling (Figure 2).

The model involves three types of actors – the Quality Management Team, the Coordinators of a Study Program and the Professors.

The Quality Management Team identifies competencies associated with a certain study program and decides to test those competencies. A Competence/Ability assessment questionnaire is developed taken into consideration the two levels proposed and explained above – Development and Utility that will identify the current level of a competence obtained by students after graduating a certain study program, respectively the desired level to be obtained according to labor market demands. The questionnaire is issued and administered to a target group. Data are collected and processed obtaining the mean values that will characterize Development and Utility dimensions. Then, each pair of values is compared. If the difference between Utility mean value and Development mean value is greater than or equal to 1 a need for improvement is identified that will target that particular competence. Based on the results obtained, if the answer of question – "Is there a need for improvement?" - is positive, the Quality Management Team will send a list of competencies to be improved to Study Program Coordinators. Else, the Coordinators of the study program are informed of positive results.

On the next swimlane, the Study Program Coordinators will analyze the list of competencies and propose a list of courses, which offer those competencies, as target of the improvement process. The suggestion is send to Professors. They are the ones that receive proposals of course improvement and develop ways to improve courses by taking into account the continuous development of specific and transversal competencies.

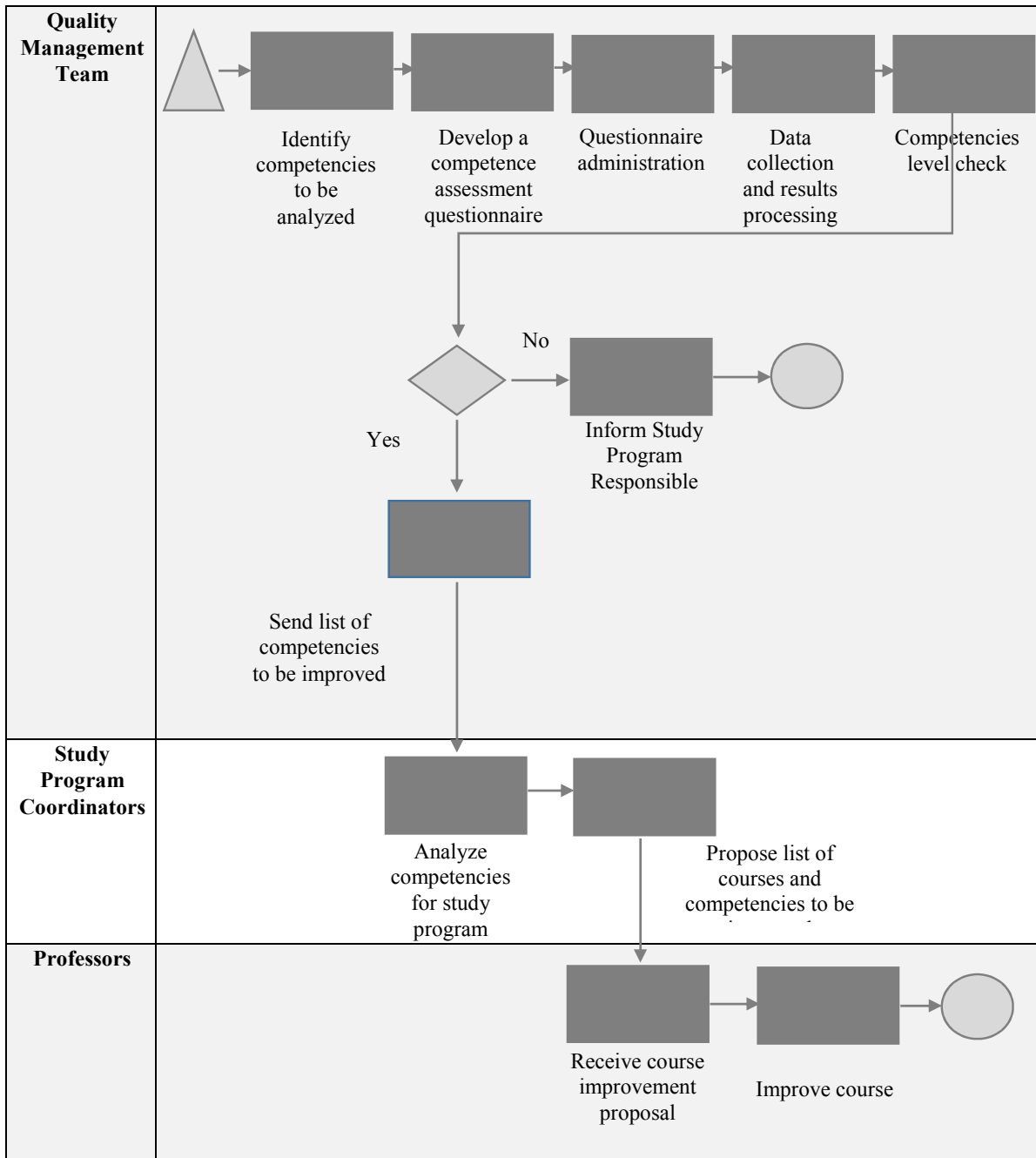


Figure 2: Business Process Model for Course Improvement

**5. Conclusions**

The adoption of business process improvement strategies is a concern of most organizations, especially higher education institutions, which are complex organizations. Even if universities are autonomous, they have to perform

functions and to develop procedures in order to fulfill the expectations of the customers. In order to improve students' and graduates' satisfaction and to remain competitive universities should manage their business process similar to enterprises. One strategy to be taken into consideration is the focus on quality services. In this case, the proposed model takes into consideration the specific and transversal competencies that graduates may develop during the study and offers a systematic, procedural and methodical model for quality improvement in higher education institutions.

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