



## **OBSTACLES IN OPERATIONS MANAGEMENT KNOWLEDGE TRANSFER IN SECONDARY SCHOOLS: CASE OF SERBIA**

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### **Abstract:**

*OM, as a field which has tremendous influence on revenue and cost should take important part in economic development of countries. Transitional countries (countries in transition from state to market economy) in particular have to take big steps if they want to achieve the economic level of developed countries. One of a critical issue for success of OM besides wider understanding of OM usefulness is quality and number of OM academic programs and courses. Therefore gathering objective information of OM studies and understanding of OM in countries is of vital interest. A critical issue for this is quality and number of OM academic programs and courses and exact explanation of OM scope of business implementation. It seems according to various researches that many universities are not aware of the importance of OM. The objective of this research is to contribute to fill this gap through exploratory study of OM education in one developing and transitional country Serbia. It is necessary, during the promotions of OM study programme, to make a clear distinction with similar programs to OM and to make a precise division of the areas of OM and the professions that come out of these areas.*

*Keywords: knowledge transfer, operations management, secondary schools.*

# 1. INTRODUCTION

Operations management (OM) used to be thought of as an internally focused business function, concerned with manufacturing goods or delivering services with its attention on efficiency and productivity (Buffa, 1976). Since the late 1950s, the increased need for companies to sharpen their competitiveness in the international market converted the operations function and productivity in general into a key competitive weapon (Boer, 2003). Transitional countries (countries in transition from state to market economy) in particular have to take big steps if they want to achieve the economic level of developed countries. Christianses et al. (2003) suggest that research in smaller countries could lead to new challenges and surprises for OM.

OM is the key factor to success and competitiveness of business, and the transfer of knowledge from this area is the basics for preparing the manager for the application of these techniques. The basic elements for transfer of knowledge in OM are:

- Understanding the area, importance, clear presentation of the content and single performance in the countries without doubling and mixing with other areas or studying programmes,
- Institutions that deal with the education in this area and course content.

Insufficient research of OM status has been identified as a gap, also mentioned by Machuca and Luque (2003), which necessities professional implementation and education in various countries, in order to improve OM field on the basis of different experiences. The identified gap is evident since only 3 studies have been done in OM education from EU countries and no one from developing or transitional countries. Transfer of knowledge is a predominant need for the success of this field.

One of the critical issues for success of OM besides wider understanding of OM usefulness is quality and number of OM academic programs and courses. Therefore gathering objective information of OM studies in countries is of vital interest (Machuca & Luque, 2003). A critical issue for this is quality and number of OM academic programs and courses. It seems that many universities are not aware of the importance of OM (Machuca & Luque, 2003).

Knowledge transfer of operations management (OM) in a globalised work is of great importance. Knowledge of areas which are studied in OM is business opportunities for organizations that are ready to implement them. Furthermore, countries in transition have a much stronger need for this implementation since their level of business effectiveness and efficiency is much lower than in developed countries and such techniques and methods can be of huge support for business improvement.

The objective of this research is to contribute to fill this gap through an exploratory study of OM education in a case study of developing and transitional country from West Balkans - Serbia. The aim is to analyze problems in knowledge transfer of OM among future students in one transitional country Serbia. Raised research questions are connected with problems of knowledge of OM field and recognition among high school students. The research analyzes the degree of understanding the area of OM among high school students, the recognition of this management field as well as a review of the understanding of OM basic areas of teaching. The research also makes connection between the wide knowledge of OM field, presence of OM studies and programs and their influence on business success. Therefore clear

understanding of study programs and subjects is of great interest for understanding the influence of knowledge transfer on OM implementation.

The paper is valuable for researchers, OM community, associations, academic staff and Universities as well as professionals for better understanding of the actual OM status and knowledge transfer in order to improve it. This matter is of relevance since we truly believe that developing economies and modern service economies need OM knowledge and practice. We need much higher level of OM understanding, courses and program existence and much more students in OM University programs and OM professionals on decision making management positions.

## **2. METHODOLOGY**

In order to get a reply to our research questions, we analyze the offer of academic programs in OM, in order to make a comparison of the OM program with competitive programs, as well as to research if prospect student's recognition and interest for OM.

These aspects have been explored in an empirical study of the current status of the knowledge transfer of OM in Serbia, based on a survey of the OM knowledge in Serbia. We also uncover potential problems in OM implementation and spreading of its knowledge areas and the steps which can improve knowledge transfer of OM to transitional countries.

In order to reply to the question if there is a difference and to what degree, on the basis of official data and systematization from the Commission for Accreditation and Quality Assurance (CAQA) of the Republic of Serbia, we made a comparison of bachelor academic programs divided in four categories:

- Category I: study program Operations Management (OM)
- Category II: study program Industrial Engineering (IE)
- Category III: study program Engineering Management (EM)
- Category IV: Study program in the area of Business Management (BM), which has some of the sub-areas of operations management in a module or major of study (for example, Quality Management).

In order to answer to posed questions we asked the following questions: Are the subjects from the area of OM strategic subjects of the program? Are the subjects from OM more represented as obligatory or optional subjects? What is the percentage in the total number of optional subjects of OM subjects? Is there a difference in the intensity and representation of subjects in the program? What is the percentage of participations of subjects in OM per years of study? What is the percentage of participation of number of hours in the total amount of classes?

At the initial stage in this study, following the list of subtopics of OM provided by Correa (2008), we considered it appropriate to perform an analysis of the characteristics of the courses recorded, in which we analysed following aspects:

- (1) Capacities (accredited)
- (2) Obligatory/Elective courses
- (3) Academic year in which course is taught

The following table shows number of OM courses by type and by category.

**Table 1:** Survey sample data

	Operations Management (OM)	Industrial Engineering (IE)	Engineering Management (IM)	Business Management (BM)
Number of universities	2	4	4	4
Number of faculties	2	4	5	4
Total number of identified courses	71	62	76	52

In order to achieve an objective result, survey in secondary schools was conducted as a descriptive survey research, following the guidelines provided by Forza (2004). The methodology applied was based on hypothesis testing, adapted for our case. The purpose of the interviews in secondary schools was to reply to the following questions:

- Recognition of OM field in secondary schools?
- Which field is usually interconnected with OM?
- Are there interests among students for OM professional engagement? Is it connected with well understanding of OM field?

The population of the participants is high school students, and the target group is students of the graduation year of high schools. According to the Ministry of Education and Sports, there are 351 high schools in Serbia, divided in the following categories: technical vocational high schools, general high schools (gymnasiums), medical vocational high schools, artistic vocational high schools. The information about the exact number of students in high schools was not possible to be obtained, but according to the information of the Ministry of Education, it can be estimated to around 300.000. If assumed that all students after the completion of the year continue to study in a higher grade, the number of students in the final year of a four-year high school would be 75.000. The sample of collected data is up to 1,2% of the total number of students of final year of secondary school.

The questionnaire consisted of 13 questions divided in the following categories: three open questions, six questions with one possible answer, four questions with more possible answers. The questions are divided in the following categories: information about the participant, information about degree of interest for the studies, information about research about OM, global information about studying. The testing of the questionnaire was conducted during the educational fair in one of the Belgrade municipalities, and the corrections of several questions were entered. One of the examples of corrections was for students in the field of municipality to enter the municipality where they live in, not the municipality where the high school is located. This change allowed us to get a clearer picture of the demographic structure of the participants.

The collection of data was realized by direct questionnaires with students in the high schools with moderation. In order to get a higher turnout of participants, we announced the time of the testing to the school managers. The campaign of gathering information lasted for 10 months.

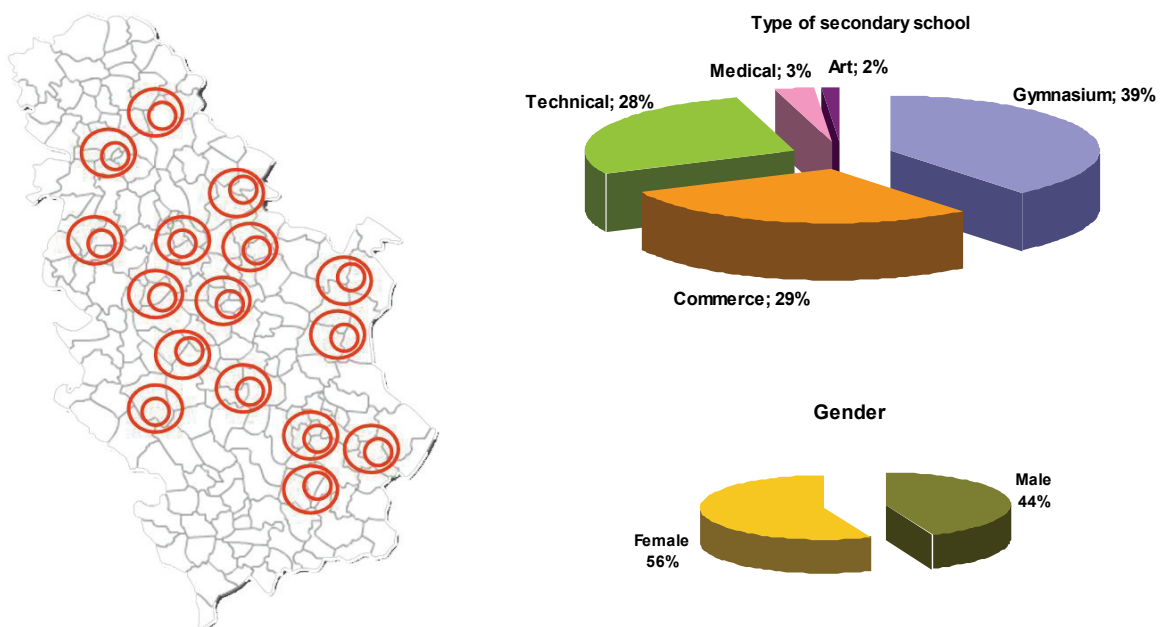
As obligatory criteria for relevance we set the principle that participants have to enter replies to the following questions: municipality of the participant, gender, high school type, question about recognition of the notion of OM, question about the recognition of a notion similar to OM. The questionnaires which did not include this information were discarded as irrelevant, which is a percentage of 11 % of total number. The feeding and processing of information was conducted by the SPSS programme for statistical interpretation. Owing to the characteristics of our study, classical tools of descriptive statistics (mean, mode, standard

deviation, coefficients of variation, frequency distribution, contingency tables, etc) processed by SPSS software was employed.

**Table 2:** Sample data for survey in secondary schools

Data	Number
Number of regions	7
Number of local municipalities in Serbia	174
Number of local municipalities in Serbia in which survey was realised	53
Number of high schools in Serbia	586
Number of high schools in Serbia in which survey was realised	93
Number of questionnaires	963
Number of non-respondent answers	109
Number of respondent answers	854

**Picture 1:** Sample data for survey in secondary schools presented by municipality, type of secondary school and gender



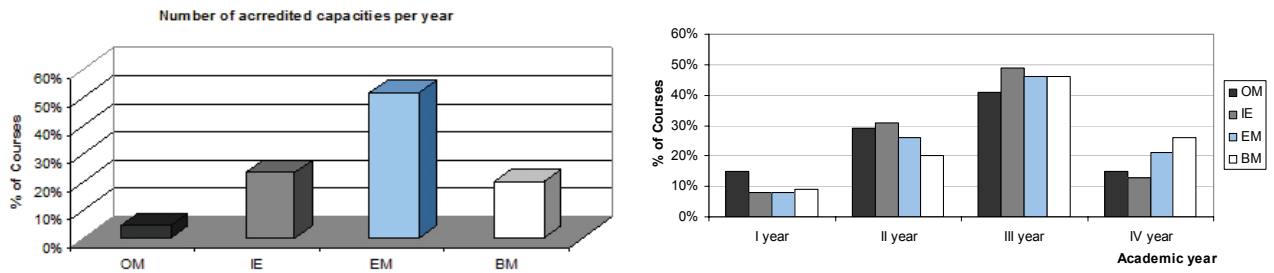
### 3. RESULTS AND DISCUSSION

Survey results are presented in following categories: results of comparison between program categories, results of survey in secondary schools.

#### 3.1. Results of academic program comparison

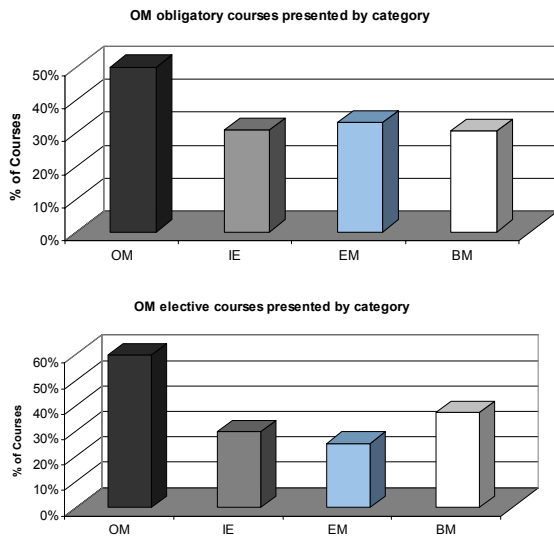
According to gained results, the number of students accredited on EM programs is notably higher than other three (OM, IE, BM) categories. For all categories, OM courses are equally arranged and usually positioned in the later academic years.

**Picture 2:** Accredited student capacities in analyzed program categories



In comparison of analyzed categories of programs considering content and representation of OM subjects in program, results discover the essential difference between OM studying programs and other programs. Obligatory and selective courses from OM field participate in much higher rate in OM program than in others.

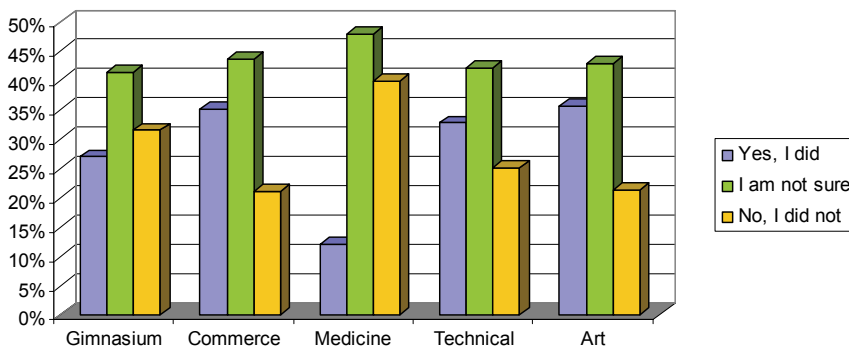
**Picture 3:** Overall characteristics of OM courses taught in analyzed categories



### 3.2. Results of survey in secondary schools

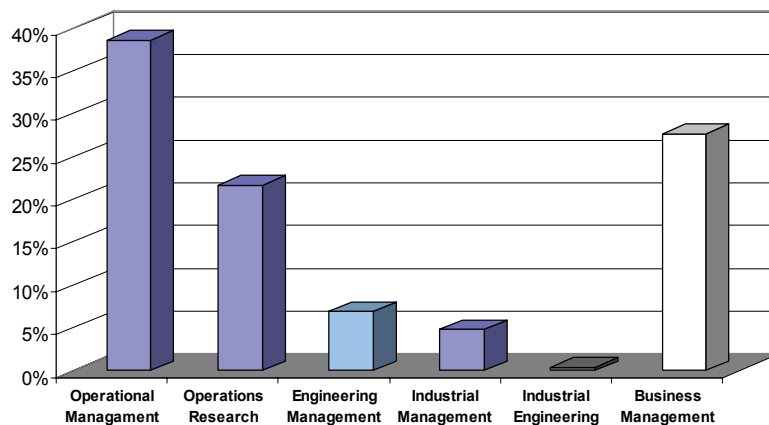
We ask three questions: Have future students heard about the term OM? What is their first association when they hear the term operations management? In which professional field, subfield of OM, they find themselves after graduation.

**Picture 4:** Responses to question „Have you heard about the term OM?“



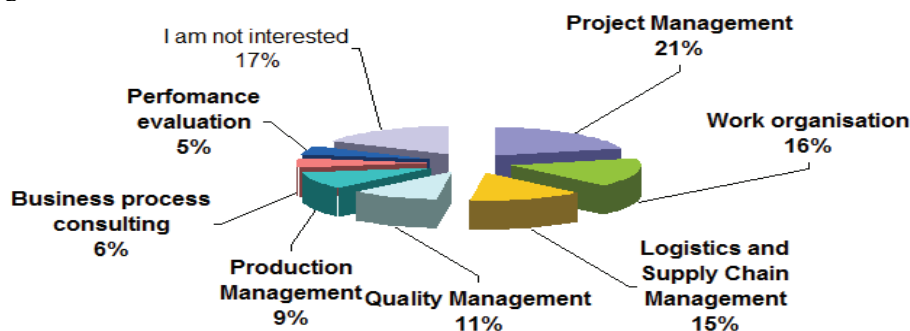
Results in response to first question show that a total 69 % of respondents did not know or were not sure if they heard about the term OM (42 % answered “I am not sure”, 27 % answered „I did not“). Such results, presented by type of secondary schools on picture 4, point to the fact that the „reluctance“ is almost equally distributed across all types of secondary schools, and there is no difference whether one type of school is „more aware“ of the concept of others.

**Picture 5:** Responses to question „What is your first association when you hear the term OM?“



Results in response to second question show that students distinguish between categories of OM and categories EM and IE. The problem is that students do not make difference between operational (executive) management and operations management, that 28 % of students see operations management as „just one“ area of business management, and 22 % of them operations management sees as a quantitative science such as of operations research.

**Picture 6:** Responses to question „Do you find yourself working in following professional fields after your graduation?“



Results in response to third question are in reciprocity with the results of the recognition of the term. Only 17 % of respondents, regardless of the answer on first question, stated that they find themselves in professions of the areas of OM, which brings us to the conclusion that the problem in the transfer of knowledge is not related to lack of interest, but only related to unrecognizability or wrong interpretation of the term.

## 4. CONCLUSION

An obstacle to a more significant application of OM practice, as well as a higher number of enrolled students lies in the problem of knowledge transfer in the subject area. The problem of

knowledge transfer of OM in education lies in the fact that the concept of OM is unrecognizable to the wider population. The research results point out that there is a core difference between four researched categories of academic programmes, and at the same time, there is no clear differentiation of the subject areas of studies among student population and students in secondary schools. Furthermore, it was noticed that there was an interest for professions which do belong to OM, but they are not recognized as professions belonging to OM area.

It is necessary, during the promotions of OM study programme, to make a clear distinction between IE, EM and BM studies and make a precise division of the areas of OM and the professions that come out of these areas. It is necessary to precise that quantitative methods, as well as operations research are just a part of the area, due to fear of too many mathematical models. At the same time, it is of great value to explain that OM is equally applied in production, as well as the services sector.

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