

## UNDERSTANDING HETEROGENEITY OF STUDENTS' PREFERENCES TOWARDS ENGLISH MEDIUM INSTRUCTION: A CONJOINT ANALYSIS APPROACH

Milena POPOVIĆ, Maja VAGIĆ,  
Marija KUZMANOVIĆ, Jelena ANĐELKOVIĆ LABROVIĆ

*University of Belgrade, Faculty of Organizational Sciences,  
Belgrade, Serbia  
milena.popovic@fon.bg.ac.rs*

Received: September 2014 / Accepted: March 2015

**Abstract:** Continuous quality improvement of the educational process and its modernization are some of the most important factors for ensuring the success of educational institutions. To attract new students and to provide a stable competitive position of a college in today's market suppose already having satisfied students. This paper introduces the methodology of conjoint analysis as an appropriate tool to determine students' preferences towards university subjects taught in English (English Medium Instruction – EMI). Conjoint analysis is a research technique that also provides an opportunity to simulate the way in which customers might react to changes in current services or to new services, introduced into an existing market. We conducted a survey among the student population at the University of Belgrade, Faculty of Organizational Science. Preference-based segmentation is performed on the conjoint data to isolate homogeneous groups of students that possess similar preferences towards EMI. Based on the results, the study suggests a strategy for creating more effective courses in English.

**Keywords:** Conjoint Analysis, Students' Preferences, English Medium Instruction, Segmentation, Simulation.

**MSC:** 62P99.

### 1. INTRODUCTION

Due to globalization, English language is continuously expanding its influence on all languages of the world. It is particularly evident in the language of the media and information technology. As the official language in many countries, including the European Union, English occupies the third place among the world languages. Therefore,

it is of great importance to provide students with the opportunity to study in English. Besides, universities become competitive in the world market and opened to international cooperation and foreign students.

The aim of this paper is to identify students' preferences, students of Faculty of Organizational Sciences, towards EMI so to improve both the existing approach to instruction and to increase the level of students' satisfaction. For that purpose, we applied conjoint analysis, one of the most widely used preference-based techniques. The objective of a conjoint analysis is to determine the most influential combination of the limited number of attributes on respondent's choice or decision making [6], and to find out possible heterogeneity in preferences. It also provides an opportunity to simulate the way in which individuals might react to changes in current services or to newly introduced services into an existing market. Namely, understanding what people most value in products or services allows to tailor marketing programs so to communicate those benefits and redesign existing products, or to create new products with those benefits.

Conjoint analysis is widely used in the field of education. Soutar and Turner [11] used conjoint and cluster analysis to suggest a better university education system for students, while Won and Bravo [13] applied conjoint model in order to enhance teaching effectiveness. Kim, Son and Sohn [3] used conjoint analysis to improve the current EMI (English Medium Instruction) lectures at universities in Korea. They conducted a survey among the students to find out their expectations from EMI teaching. In some studies, researchers have aimed to improve student's satisfaction and learning by focusing on identifying his/her needs. These studies also aimed to increase student's participation in designing the course curriculum and its improvement [12]. Kuzmanovic, Savic, Popovic and Martic [7] propose a new conjoint-based approach to students' evaluations of teaching that takes into account students' preferences.

The paper is organized as follows. The methodology of conjoint analysis and the model of consumer preferences are described in Section 2. Section 3 presents the results of the empirical study conducted among students of The University of Belgrade. Finally, the main conclusions are summarized in Section 4.

## 2. CONJOINT ANALYSIS - MODELING CUSTOMERS' PREFERENCES

Conjoint analysis is introduced in the 1960s by mathematical psychologists Luce and statisticians Tukey [8]. Because people tend to be better at giving well-ordered preferences if evaluating options together ("conjointly"), the method relieves a respondent from the difficult task of accurately introspecting relative importance of individual attributes for a particular decision [2].

Conjoint model transforms consumers' subjective attitudes towards estimated parameters into the form of utility functions, thereby making it possible to observe the consequences for the overall preference of a change in the level of an attribute. It also allows researchers to implicitly estimate the relative importance of individual pre-specified attributes. This provides the advantage of better reflecting the consumers' decision process in the actual purchase situation.

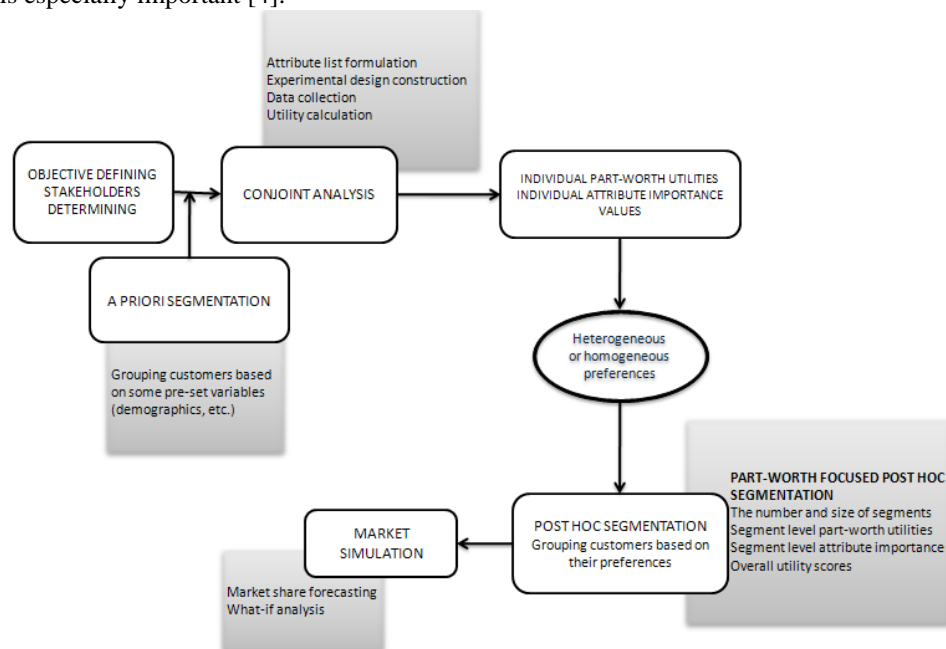
### 2.1. Methodology of Conjoint analysis

An application of conjoint analysis includes the following key steps (Figure 1):

1. List of key attributes and attribute levels formulation;
2. Efficient experimental design construction;
3. Data collection;
4. Utility calculation;
5. Market segmentation;
6. Market simulation.

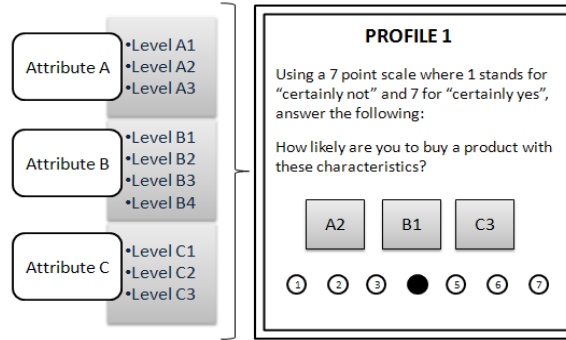
Conjoint analysis starts with determining the relevant attributes of a product or service that are believed to influence a consumer's preference. They should include those that potential customers regard as relevant and those that can be influenced or manipulated by the provider. Then, levels are to be assigned to them, which must be plausible, actionable and capable of being traded-off one against another [7].

Once attributes and their respective levels are selected, the product profiles should be created [6]. Each profile is a combination of attribute levels for the selected attributes (see Figure 2). The number of possible profiles increases greatly with the increasing number of attributes or levels. For example, five attributes, each having four levels will result in  $4^5 = 1024$  profiles, each requiring at least one observation in order to estimate all the possible effects. Thus, fractional factorial designs, which assume no interactions between attributes and ensure the absence of multicollinearity, are usually used to reduce the number of profiles. In this reduction process, the applicability of the reduced designs is especially important [4].



**Figure 1:** Conjoint analysis implementation procedure and its application for market segmentation

The experimental procedure further involves rating or ranking the profiles presented to respondents who are invited to express their preferences towards them [6]. Preference functions are estimated from this data, using ordinary least squares regression for rating the data, or ordinal techniques when the rankings are obtained. These functions assume preference to be a linear-in-parameters function of the attributes included in the profiles.



**Figure 2:** Creating profiles in conjoint analysis.

### 2.2. Model of customer preferences

The simplest and most commonly used conjoint model assumes that the overall utility derived from any combination of attributes of a given product or service is obtained from the sum of the separate part-worth of the attribute levels. Thus, respondent  $i$ 's ( $i = 1, \dots, I$ ) predicted conjoint utility for profile  $j$  ( $j = 1, \dots, J$ ) can be specified as follows:

$$U_{ij} = \sum_{k=1}^K \sum_{l=1}^{L_k} \beta_{ikl} x_{jkl} + \varepsilon_{ij}, \quad (1)$$

where  $K$  is the number of attributes,  $L_k$  is the number of levels of attribute  $k$ .  $\beta_{ikl}$  is respondent  $i$ 's utility with respect to level  $l$  of attribute  $k$  (part-worth utilities).  $x_{jkl}$  equals 1 if profile  $j$  has attribute  $k$  at level  $l$ , otherwise it equals 0.  $\varepsilon_{ij}$  is a stochastic error term.

The value of parameters  $\beta_{ikl}$  indicates the amount of any effect that an attribute level has on overall utility. It can be further used to calculate the relative importance of each of  $K$  attributes. These values are calculated by taking the utility range for each attribute separately, and then dividing it by the sum of the utility ranges for all of the factors [6]:

$$FI_{ik} = \frac{\max_l \{\beta_{ikl}\} - \min_l \{\beta_{ikl}\}}{\sum_{k=1}^K (\max_l \{\beta_{ikl}\} - \min_l \{\beta_{ikl}\})}, \quad i = 1, \dots, I, k = 1, \dots, K, l = 1, \dots, L_k \quad (2)$$

In some surveys, conjoint analysis has been combined with cluster analysis in order to group the respondents on the basis of their preferences [7]. Some researchers have used natural groups within the group of respondents to study preferences among the groups [1]. Kuzmanović, Panić and Martić [5] separated different stakeholder groups to reveal

their preferences. It is also possible to include socioeconomic questions that can be used to divide the respondents into different groups.

Overall utility scores ( $U_{ij}$ ) can be used to market simulations to find out all hidden effects that could have influence on products' market share. The simplest simulation specifies several competitive products in terms of their attribute levels, and then predicts which of those products each respondent would prefer. Such results may be used to estimate market share for hypothetically new or modified products, as well as their potential revenue and likely profitability. In the absence of competitive products, conjoint data can also be used to simulate respondents' likelihood of purchasing specific products.

### 2.3. Conjoint simulation models

There are several methods for simulating preferences. Some of them are: First Choice or Maximum Utility, Bradley-Terry-Luce (BTL) model and Logit model [4].

**First Choice or Maximum Utility** is the simplest simulation method and can be easily understood. Each respondent's utility for each product is estimated by summing the appropriate part worth. The utilities for all products are compared, and the respondent is assumed to choose the product with maximum utility. In other words, we assume that all of a respondent's choice likelihood accrues to his "first choice" product, regardless of the magnitude of difference in utility between that product and the others. The estimate of a product's share of market is simply the percentage of respondents for whom it has the highest utility:

$$P_j = \frac{\text{number of respondents who prefer product } j}{I} \quad (3)$$

where  $I$  is the number of respondents.

First choice simulations also have some undesirable properties. They tend to exaggerate the shares of popular products and underestimate the shares of unpopular products. Further, unlike other methods, there is no way to "tune" them to compensate for this characteristic. A second shortcoming is that since all of a respondent's choice likelihood is allocated to a single product, the standard errors of the resulting shares are larger than with other methods that distribute a respondent's choice likelihood across several products.

**Bradley-Terry-Luce (BTL) model.** Unlike the maximum utility model, the BTL model does not assign probability of choice all to the most preferred product. Probability is a continuous function of utility. While in the maximum utility model, probability of choice is a binary step function of utility, in the BTL model, probability of choice is a linear function of utility.

The BTL model computes the probabilities by dividing each utility by the sum of the utilities within each subject:

$$P_{ij} = \frac{U_{ij}}{\sum_{j=1}^m U_{ij}} \quad (4)$$

where  $P_{ij}$  represents the probability that customer  $i$  will choose the  $j$ th profile from a set of  $m$  existing profiles on the market.

**Logit model** also does not assign probability of choice all to the most preferred product. Probability of choice is an increasing curvilinear function of utility. The logit model divides the exponentiated utilities by the sum of exponentiated utilities, again within a subject:

$$P_{ij} = \frac{e^{bU_{ij}}}{\sum_{j=1}^m e^{bU_{ij}}}, \quad i = 1, \dots, I, \quad j = 1, \dots, J \quad (5)$$

where  $P_{ij}$  represents the probability that customer  $i$  will choose the  $j$ th profile from a set of  $m$  existing profiles on the market. The exponent  $b$  is used to fine-tune the results so that they reflect the current customer behaviour on the market more accurately.

### 3. EMPIRICAL STUDY

In order to elicit the students' preferences towards EMI and to determine the ideal structure of the subject, conjoint analysis was applied.

#### 3.1. Study design

The list of key attributes for EMI is created based on literature review [3]. For the purpose of this study, five selected attributes and the levels assigned to them are shown in Table 1. Experimental design with 16 profiles was generated using SPSS 16 (Orthogonal design procedure). In order to check the quality of the obtained data, two control profiles (holdout tasks) are added to this design. Students were asked to rate each scenario profile on a Likert's scale of 1 to 7, where 1 indicated "dislike very much", and 7 indicated "like very much".

The survey was conducted among the students of The University of Belgrade, Faculty of Organizational Sciences, from November 2012 to January 2013. In total, 96 students completed the questionnaire. However, 8 questionnaires were eliminated since the students filled in the questionnaire with a monotonous pattern (e.g. marking all profiles as 7 or 1), or left some items empty, or filled in their personal information form but left other items empty. After the elimination, the number of valid questionnaires was 88, giving a total 1408 observations. While this sample size may be regarded as relatively small, it is not atypical for conjoint analysis application if the goal of a survey is investigation, or development of hypotheses about market [10].

There were 59 (67.0 %) female students and 29 (33.0 %) male students. Almost a half of the participants were students of Management Department (48.9%), while 30.7% were the students of Information systems and technology, and the rest 20.4% were students of Quality and Operational Management.

#### 3.2. Aggregated student preferences

To estimate conjoint parameters, the statistical package SPSS 16.0 (conjoint procedure) was used. The parameters are estimated for each respondent in the sample individually, as well as averaged. A high value of the Pearson coefficient, 0.998, confirms the high level of significance of the obtained results. Similarly, high value of

the Kendall correlation coefficient, 0.967, indicates a high level of correlation between the observed and estimated preferences. The Kendall coefficient for holdout profiles has value of 1.000, which is an additional indicator of the high quality of the obtained data.

The averaged importance values of attributes and part-worth are presented in Table 1. Very surprising fact is that respondents find Class size as the most important attribute (24.94%), more specifically a group of 20 students. Of slightly lower importance are the attributes Diploma Supplement and Language, while Course type is the least important attribute (11.62%).

**Table 1:** Averaged part-worths and attributes importance

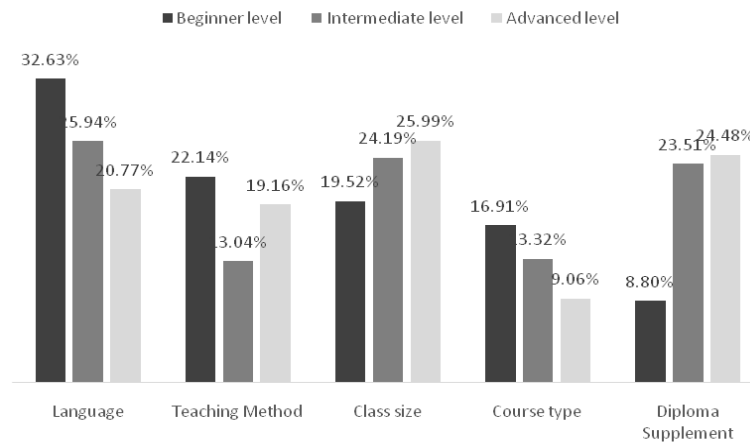
Attributes	Attribute levels	Part-worth utilities	Importance values
Course type	Elective	-0.092	<b>11.62%</b>
	Mandatory	0.092	
Class size	Up to 20 students	0.571	<b>24.94%</b>
	From 20 to 60 students	0.034	
	More than 60 students	-0.605	
Teaching method	Interactive	0.300	<b>16.17%</b>
	Ex Cathedra	-0.300	
Language	Only English	0.098	<b>23.63%</b>
	Extra materials in Serbian	-0.209	
	Final exam in Serbian	0.112	
Diploma Supplement	Yes	0.633	<b>23.64%</b>
	No	-0.633	
Constant = 4.251			

Based on the Conjoint data, it can be concluded that the most preferred EMI on aggregate level has the following characteristics: the course has to be mandatory, class size is up to 20 students, teaching method is interactive, final exam should be in Serbian language, and there has to be a diploma supplement.

### 3.3. Segment level preferences

In order to determine whether there are differences in the preferences of a specific group of respondents, we performed analysis for the predefined segments, too. A priori segmentation was performed based on the students' knowledge of English language. The sample consisted of two students (2.3%) at the beginner level of English, 44 students (50%) at the intermediate level, and 42 (47.7%) at the advanced level.

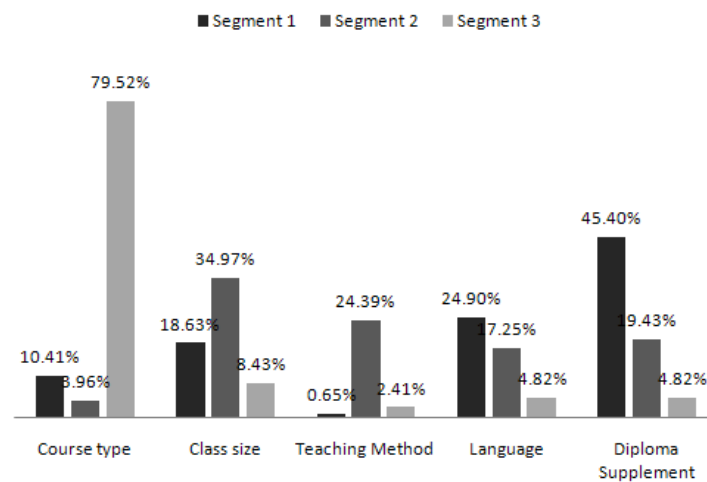
For beginners and students at the intermediate level, the most important attribute is Language (32.63%), namely, taking the final exam in Serbian. This was expected because their level of English proficiency is low or they do not feel confident enough to take exams in English (see Figure 3).



**Figure 3:** Segment-level attributes importance

A more detailed analysis of part-worth at the individual level revealed wide heterogeneity in consumer preferences. Therefore, a cluster analysis was performed to classify respondents into more homogeneous preference groups. These part-worths are then used as input for cluster analysis. This approach has been conducted by various researchers across industries in order to determine customer segments, based on distinct preference profiles [7], [9].

The K-means cluster procedure in SPSS 16.0 was used to perform the segmentation. An analysis of variance revealed that the segments in the 3-cluster solution differed significantly from each other, with respect to their part-worths generated by the conjoint analysis. The importance values of attributes for each of the identified segments are shown in Figure 4.



**Figure 4:** Segment-level attributes importance



The first segment includes 40 students (45.45% of the total sample). The most important attribute for this segment is Diploma Supplement (45.40%). The second most important attribute is the Language (24.90%), where they prefer level – final exam in Serbian. The least important for them is teaching method (0.65%). Most of this segment members attend first or the second year of college, and their knowledge of English language is at the intermediate level. Due to the aforementioned characteristics this segment was named "Certificate fans" (above all there should be a Diploma Supplement). It lead to conclusion that the students of this segment do not want to invest effort in their studies but to get a degree the fastest, the simplest, and the easiest way possible. This is because they perceive a degree as "a way to a better and safer life." However, one must take into account that the majority of this segment just "got out" from the high school and have not still developed awareness of the requirements and laws of the market, where practical experiences, skills, and extra-curricular activities are as important as a degree.

The second segment consists of 46 respondents, representing 52.27% of the total sample. For the members of this segment, the most important attribute is the Group size (34.97%) that should not exceed 20 students. Interactive teaching is also very important for them (24.39%). This suggests that they prefer working in small group settings, which allow them to exchange ideas. Existence of a Diploma Supplement is desirable, and also having teaching and exams only in English. Most of this segment members are in the final year of study, and their knowledge of English is at the advanced level. They are the ones we recognize as "Young leaders", who tend to use their full potential during their studies and later in their career. Students of this segment are characterized by continuous work, dedication, and desire to become professionals in their field of study. They have a high level of self-actualization and strive to have successful and influential career.

The third segment includes only 2 students. The most important attribute for them is that the Course type, which they will take in English, is an elective one (79.52%). Students of this segment are characterized by the desire to take only those courses in English that are of their own choice ("Choice above all"). Apropos, they are willing to listen in English only what interests them.

### 3.3. What if analysis

To simulate the way in which students might react to changes in the characteristics of subjects, "what if" analysis was carried out. Three different scenarios (subjects) are considered. Subject characteristics and their share of preferences calculated by using logit model, are given in the Table 2.

In **Scenario 1**, we attempted to determine effects of introducing teaching fully in English (Subject 1), compared to subjects (Subjects 2 and 3) that, as such, already exist at college. In this scenario, the highest share of preferences goes to Subject 1 (41.0%), followed by Subject 2 (30.3%) and Subject 3 (28.7%).

Reducing class size is far easier to perform than introducing teaching fully in English. Thus, **Scenario 2** analyse the situation of reducing class size in the Subject 2 and its influence on the share of preferences. In this case student's preferences towards Subject 2 increased by 7.6% in comparison to Scenario 1. Unquestionably, it can be concluded that students highly value work environment of small groups.

According to aggregate level attribute importance, one of the most important attributes was Diploma supplement, whose influence is examined in **Scenario 3**. After assigning Subject 2 with diploma supplement, its share of preferences increased by

28.5% compared to Scenario 1. This enormous increase of share of preferences shows how substantial existence of diploma supplement is for students.

It should be noted that characteristics of Subject 1 and Subject 3 remained the same during the simulation.

**Table 2:** What if analysis

Scenario	Subject	Subject characteristics	Share
S 1	Subject 1	The course type is elective; Class size is from 20 to 60 students; Teaching method is ex Cathedra; Teaching and exams are only in English; There is a diploma supplement	41.0%
	Subject 2	The course is mandatory; Class size is from 20 to 60 students; Teaching method is interactive; Final exam is in Serbian language; There is a no diploma supplement	30.3%
	Subject 3	The course is mandatory; Class size is more than 60 students; Teaching method is ex Cathedra; Final exam is in Serbian language; There is a diploma supplement	28.7%
S 2	Subject 1	The course type is elective; Class size is from 20 to 60 students; Teaching method is ex Cathedra; Teaching and exams are only in English; There is a diploma supplement	36.1%
	Subject 2	The course is mandatory; <b>Class size is up to 20 students;</b> Teaching method is interactive; Final exam is in Serbian language; There is a no diploma supplement	37.9%
	Subject 3	The course is mandatory; Class size is more than 60 students; Teaching method is ex Cathedra; Final exam is in Serbian language; There is a diploma supplement	26.0%
S 3	Subject 1	The course type is elective; Class size is from 20 to 60 students; Teaching method is ex Cathedra; Teaching and exams are only in English; There is a diploma supplement	24.8%
	Subject 2	The course is mandatory; Class size is from 20 to 60 students; Teaching method is interactive; Final exam is in Serbian language; <b>There is a diploma supplement</b>	58.8%
	Subject 3	The course is mandatory; Class size is more than 60 students; Teaching method is ex Cathedra; Final exam is in Serbian language; There is a diploma supplement	16.4%

Subjects described in the simulation in most cases already exist, or it is necessary to make very small changes in order to make them exist. Simulation showed that a slight change in subject characteristics can significantly influence students' preferences towards that subject.

#### 4. CONCLUSION

Today, not only companies, but universities worldwide must ensure a competitive advantage in order to attract students, that is, to survive in the market. The first step towards achieving status of international university is to introduce EMI. To create more

effective courses in English, it is important to understand the requirements and preferences of students.

In this paper we used conjoint analysis to determine students' preferences towards EMI, and to perform segmentation in order to find out whether there are differences between certain groups of students. To show how the students will respond to changes in teaching, a simulation was performed.

Post hoc segmentation, based on the students' preferences, showed substantial differences between the segments. Three different groups (segments) were identified: "Certificate fans", "Young leaders", and "Choice above all". The results of the research showed that the students' opinions depend on the year of the study they attend. While students of lower academic years prefer to finish college and get a degree as soon as possible investing the least effort, final year students' attitude is much more mature. Most of them have developed an awareness of the need for continuous improvement of personality, both on the professional and personal level. Indicating which characteristics should be paid attention to and how the EMI should be structured, these data appear to be very useful.

A priori segmentation was done according to students' level of English proficiency (beginner, intermediate, advanced). It pointed out to the similarity of respondents at the advanced level of English to the segment "Young leaders", which is understandable if one considers that the majority of "Young leaders" have advanced knowledge of English.

The simulation showed that the increase of students' preferences towards EMI does not require large investments and that only small changes in subject structure are sufficient to significantly influence the preferences. Depending on the type of the course, it may be a reduction of the group size to "up to 20 students", organizing the teaching entirely in English, or existence of a Diploma supplement.

The fact that the sample consisted only of the students of the Faculty of Organizational Sciences limits the applicability of the results only to the faculties of managerial and economic profile, though there is a hope that future studies will contribute to more elaborate structure of teaching in English.

## REFERENCES

- [1] Anderson, R.C., and Hansen, E.N., "The impact of environmental certification on preferences for wood furniture: a conjoint analysis approach", *Forest Products Journal* 54(3) (2004) 42–51.
- [2] Green, P., and Srinivasan, V., "Conjoint Analysis in Marketing Research: New Developments and Directions", *Journal of Marketing*, 54 (1990) 3-19.
- [3] Kim, A., Son, D. Y., and Sohn S.Y., "Conjoint analysis of enhanced English Medium Instruction for college students", *Expert Systems with Applications*, (2009) 10197-10203.
- [4] Kuzmanović, M., *Kvantitativne metode u upravljanju marketingom: Primena Conjoint analize*, Društvo operacionih istraživača, Beograd, 2006. ISBN: 86-7172-024-1.
- [5] Kuzmanovic, M., Panic, B and Martic, M., "Identification of Key Positioning Factors in the Retail Sector: A Conjoint Analysis Approach", *African Journal of Business Management*, 5(26) (2011) 10376-10386.
- [6] Kuzmanovic, M., Savic, G., Gusavac Andric, B., Makajic-Nikolic, D. and Panic, B. "A Conjoint-based Approach to Student Evaluations of Teaching Performance", *Expert Systems with Applications*, 40(10) (2013) 4083–4089.

- [7] Kuzmanovic, M., Savic, G., Popovic, M., and Martic, M., “A New Approach to Evaluation of University Teaching Considering Heterogeneity of Students' Preference”, *Higher Education*, 66 (2) (2013) 153-171.
- [8] Luce, R.D., and Tukey, J.W., “Simultaneous Conjoint Measurement: A New Type of Fundamental Measurement”, *Journal of Mathematical Psychology*, 1 (1964) 1-27.
- [9] Mankila, M., “Retaining students in retail banking through price bundling: Evidence from the Swedish Market”, *European Journal of Operational Research*, 155 (2004) 299-316.
- [10] Orme, B., “Sample Size Issues for Conjoint Analysis (Chapter 7)”, *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research*. Reprinted from Orme B. Madison, Wis.: Research Publishers LLC (2006).
- [11] Soutar, G. N., and Turner J. P., “Students' preferences for university: A conjoint analysis”, *The International Journal of Educational Management*, 16 (1) (2002) 40-45.
- [12] Wiklund, P. S., and Wiklund, H., “Student focused design and improvement of university courses”, *Managing Service Quality*, 9 (6) (1999) 434-443.
- [13] Won, D., and Bravo, G. „Course design in sport management education: Addressing students' perspectives through conjoint methodology“, *Journal of Hospitality, Leisure, Sport & Tourism Education*, 8 (2) (2009) 83-96.