

## **DETERMINING CUSTOMER VALUE DIMENSIONS: A CONJOINT ANALYSIS APPROACH**

Marija Kuzmanović\*, Bisera Andrić Gušavac\* and Milan Martić\*

\* Department of Operations Research and Statistics, Faculty of Organizational Sciences,  
University of Belgrade, Jove Ilica 154, Belgrade, Serbia,  
Email: mari@fon.bg.ac.rs  
Email: bisera@fon.bg.ac.rs  
Email: milan@fon.bg.ac.rs

---

**Abstract** In today's highly competitive environment, where sources of product and process-based competitive advantage are quickly imitated by competitors, it is becoming increasingly difficult to differentiate on technical features and quality alone. Companies may overcome this problem by incorporating the 'voice of the customer' into the design of new products and focusing on customer value, thereby offering total solutions to customer needs. Therefore, it is critical for all technology-based companies to gain an accurate understanding of the potential value of their offerings, and to learn how this value can be further enhanced. An important tool to elicit customer value at an early stage of the product development is the conjoint analysis. Conjoint analysis is a research technique for measuring customers' preferences, and it is a method for simulating how customers might react to changes in current products or to new products introduced into an existing competitive market. The paper will show how conjoint analysis can be used to bridge the information gap between the company and its customers, by confronting the value the company intends to offer with the value desired by its customers.

**Paper type:** Conceptual Paper

**Published online:** 14 October 2011  
Vol. 1, No. 3, pp. 139-150

ISSN 2083-4942 (Print)

ISSN 2083-4950 (Online)

© 2011 Poznan University of Technology. All rights reserved.

---

**Keywords:** *Customer value, market orientation, conjoint analysis, preferences, product development*

---

## 1. INTRODUCTION

In today's highly competitive business environment, companies are forced to manage their activities primary to meet customers' needs and expectations and provide excellent service to the customer, while at the same time keep their profitability and competitiveness. However, to achieve their strategic goals companies must go further than achieve mere customer satisfaction: they must do much better than their competition. Many companies claim that they are customer-driven or focused. They often support this claim with evidence from extensive research studies. Even though, for every successful new product launch, there are endless failures. Such mistakes are often attributed to a failure to understand customer needs. However, the real problem is much more specific; it is a failure to understand the right customer needs and desires.

For understanding customer needs and studying them systematically it is necessary to be acquainted with the concept of creating value to the customer. Walters and Lancaster (1999) have stated that value is created by any product or service attribute, which motivates the customer to buy the product and takes him closer to achieving his goals. Although customers wish all their needs would be satisfied at once, it is company's objective to understand which needs are most important for the customer. This understanding enables a company to use its scarce resources in an optimal way, thus creating the most value for the customer. Clearly company has to make tradeoffs in the performance levels of attributes which are related to each other. Therefore, it is critical for companies to gain an accurate understanding of the potential value of their offerings and to learn how this value can be further enhanced (Parasuraman, 1997), (Woodruff, 1997). Accordingly, the clear estimation of the value a product or service might offer to the customer has become a topic of growing interest in the field of industrial marketing.

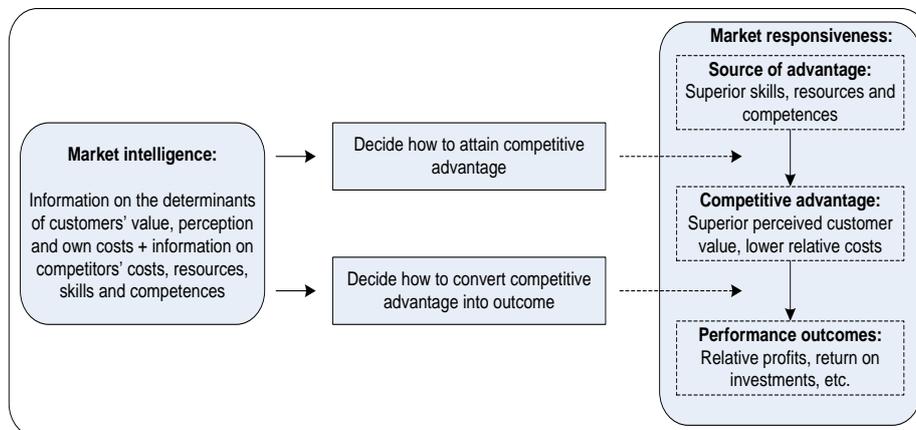
It is essential importance in product development process that the customers' needs and expectations are taken into consideration from the earliest phases on. An important tool which can be used to elicit customer value at an early stage of product development process is the conjoint analysis. It is a multivariate technique developed to provide a method for determining the relative contribution of multiple factors to consumer satisfaction. It has been widely used in several fields of economics as well as in marketing research (Green & Srinivasan, 1990), (Hair, Anderson, Tathan & Black, 1995), (Kuzmanović, 2006), (Kuzmanović & Obradović, 2010), (Wittink, Vriens & Burhenne, 1994).

Conjoint analysis allows finding out which product attributes create most value to a customer and how customers are likely to react to different product configura-

tions. This information can lead to the creation of optimal value offers. The aim of this paper is to analyze the applicability of conjoint analysis for closing the information gap between the company and its customers, by confronting the value the company intends to offer to its customers with the value desired by them.

## 2. MARKET ORIENTATION AND CONSUMER-ORIENTED PRODUCT DEVELOPMENT

In today's global economy there is clearly a need for companies to develop further their understanding of the markets in which they operate and skilfully apply this understanding in the creation of competitive advantage. Perhaps the most adequate way to achieve this is through the implementation of the market-oriented concept (Grunert et al., 1996). Market-oriented companies are those which have committed themselves to the continuous generation and internal dissemination of market intelligence relevant to the current and future needs of their customers, as well as to the continuous improvement of their responsiveness to such needs (Kohli & Jaworski, 1990). Figure 1 depicts how the creation on market intelligence is related to the attainment of competitive advantage.



**Fig. 1.** Creation of market intelligence, market responsiveness and competitive advantage (adopted from Grunert, Baadsgaard, Larsen & Madsen, 1996)

It has been suggested that more market-oriented companies may actually seek out and thrive in more turbulent conditions (Gray, Matear, Boshoff & Matheson, 1998), when customer needs and behaviours and industry technology are changing quickly, and/or when markets are growing rapidly and competition is intense. Therefore, to create superior customer value, a company should be customer-

oriented, competitor-oriented and inter-functional coordinated; in other words, it should be market-oriented (Narver & Slater, 1990).

Market-oriented companies aim to understand both expressed and latent customer needs, and to develop superior solutions to those needs. Jaworski and Kohli (1996) point out that reacting to customers' expressed needs is usually insufficient for the creation of competitive advantage. The opportunity to build strong customer loyalty arises when companies have the ability to understand and satisfy customers' latent needs (Slater, & Narver, 1999). Market-oriented companies are also more aware of the alternatives which competitors offer. Hence, these companies may position new products and services more effectively, may be able to charge higher prices for added value, and/or may increase value for customers by reducing customer-perceived sacrifice (Ravald & Gronroos, 1996).

The concept of consumer oriented new product design can be seen as a special case of market-based innovation. It is an integrated concept concerning the use of consumers' current and future needs, and its determinants, in the development of improved or innovative products/services with added value. The main principles of consumer-oriented new product development are that (Grunert et al., 1996):

- Consumers' needs should be the starting point of the new product development process;
- The goals of new product development should be the fulfilment of consumer needs and realisation of consumer value, rather than the development of products or enabling technologies per se;
- Sales and satisfactory returns on investments can only be achieved by anticipating, identifying and satisfying consumer needs; thus the new product development process's measure of success should be the degree of fit between the new or improved product and consumer needs

It is clear that such a consumer-oriented approach can greatly increase the likelihood of success of product development process (Dahan & Hauser, 2002).

### **3. THE CUSTOMER VALUE CONCEPT**

The customer value concept is considered to be one of a company's most significant success factors and has been identified as an important source of competitive advantage (Mizik & Jacobson, 2003), (Spiteri & Dion, 2004).

Basically, the customer value concept assesses the value a product offers to a customer, taking all its tangible and intangible features into account. Most authors agree that it concerns to a trade-off between the benefits the product offers to the customer, and the sacrifices a customer has to make to obtain it. Specifically, customer sacrifices are the overall monetary and non-monetary costs, for example time, energy and effort, the customer invests in order to get the product or service, or to maintain the relationship with the company. Benefits can be affected by

a variety of factors: product quality, customer service quality and experience based quality. Additionally it is also often pointed out that brand can create value to customers. Therefore, a customer  $i$  will choose among the available alternatives that product  $j$  with the highest Benefits/Costs ratio, i.e.:

$$\max_j CV_{ij} = \frac{\sum_{b=1}^B U_{ijb}}{\sum_{s=1}^S P_{ijs}}, \quad i = 1, \dots, I, \quad j = 1, \dots, J, \quad (1)$$

where  $P_{ijs}$  ( $s = 1, \dots, S$ ) is a bundle of costs (sacrifices) which customer  $i$  has to make to obtain product  $j$ , while  $U_{ijb}$  ( $b = 1, \dots, B$ ) is a bundle of benefits received from product  $j$ . This ratio may differ considerably among customers because of the differences in their individual situation and preferences.

A number of authors have linked achieving higher customer value to higher profitability for the company (Sánchez & Iniesta, 2006), (Smith & Colgate, 2007). However, it should be noted that just bringing a product to the market with a high potential customer value is no guarantee for a high market share or profits per se, because the customer's purchase decision is based on a choice between the competing offers in the market place. The attractiveness of an individual product offer should always be measured relative to competing products.

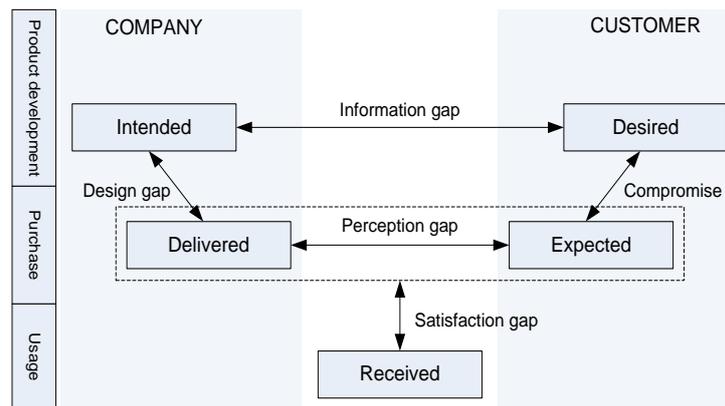
#### 4. THE CONCEPTUAL MODEL OF CUSTOMER VALUE

The key stages in the formulation of the consumer-oriented new product design concept follow closely a market-oriented approach: need identification, idea development to fulfil the need, product development to substantiate the idea and the product's market introduction, communicating the fulfilment a need. Central here is the ability to "translate" the subjective consumer needs into objective product specifications, in order to, through the creation of the core product, substantiate the fulfilment of these needs.

The Customer value model, presented in Figure 2, shows the product development process from vague idea to market offer both from the company's and the customer's perspective. The model is based on the SERVQUAL model developed by Parasuraman, Zeithaml and Berry (1988) to assess the customer satisfaction of service offerings.

At the start of the product development process, the company may have only vague ideas about the value it intends to offer to its customers. This value depends on the company's perceptions of what the customer wants, and is based on its strategy, capabilities and resources (*intended value map*). Through market research, the company will try to match its intended value map with the preferences and desires of the future users (*desired value map*) to create a product that fulfils

the customer needs. An information gap may occur between these two maps. This gap reflects a situation in which the company has insufficient information about what the customer desires. Due to restraints in the company's strategy and/or marketing capabilities, the company may focus on the *wrong* customer needs.



**Fig. 2.** The Customer value model

The value of the product as created by the company and introduced to the marketplace is called the *delivered value map*. The delivered value may differ from the intended value because of technical constraints and/or miscommunication between marketing and product development departments. This will result in the *design gap*. Customers base their expectations of the product's performance on what they perceive. This expectation is called the *expected value map*. This map may differ from the desired value map because there might not be any product on the market that exactly matches the customers' desires. Therefore, customers have to choose that product that best matches their expectations. In other words, they have to make a *compromise* between the value they perceive in the marketplace and the value they would desire. The smaller this compromise gap, the higher the chance that the company is successful in winning customers. The *perception gap* reflects the potential mismatch between the value delivered by the company, and the customers' perception of this value. How potentially advantageous a product offer might be for customers, if they do not recognize this at the purchasing decision, it is of no use to the company. A company can try to reduce this gap by making certain intangibles more tangible via corporate communication. After the purchase and usage, customers will evaluate the value they have received. The outcome of this evaluation is called the *received value map*. The *satisfaction gap* reflects the gap between the expected and the received value.

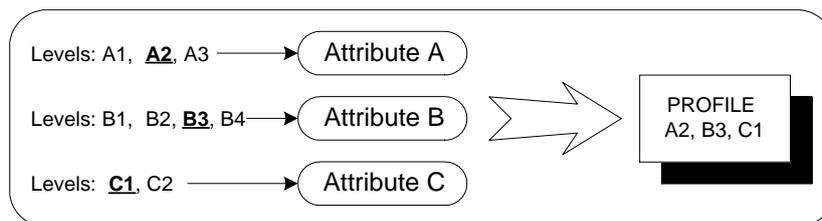
Although the conceptual importance of customer value is increasingly recognized in the marketing literature, its application in real-life industrial market studies

lags behind, merely because the concept implementation still poses difficulties to the market researcher. The problem is that especially for new products, the customers' goals and desires are often vague and therefore difficult to assess for the market researcher.

#### 4. CONJOINT ANALYSIS

Conjoint analysis is an experimental approach for measuring customers' preferences about the attributes of a product or service. Originally developed by psychologist Luce and statistician Tukey (1964) in the field of mathematical psychology, conjoint analysis has attracted considerable attention, especially in marketing research, as a method that portrays customers' decisions.

Conjoint analysis, sometimes called 'trade-off analysis', reveals how people make complex judgments. The technique is based on the assumption that complex decisions are made not based on a single factor, but on several factors CONsidered JOINTly, hence the term Conjoint.



**Fig. 3.** Relations between the profile, attributes and the attribute levels

The way of the conjoint analysis implementation could be simply explained as follows. Researchers at first develop a set of alternative products (real or hypothetical) in terms of bundles of quantitative and qualitative attributes through fractional factorial designs. These real or hypothetical products, referred to as profiles (see Figure 3), are then presented to the customers during the survey. The customers are asked to rank order or rate these alternatives, or choose the best one. Because the products are represented in terms of bundles of attributes at mixed *good* and *bad* levels, the customers have to evaluate the total utility from all of the attribute levels simultaneously to make their judgements. Based on these judgements, the researchers can estimate the part-worth utilities for the attribute levels by assuming certain composition rules. The rules explain the structure of customer's individual preferences. The manner that respondents combine the part-worths in total utility of product can be explained by these rules. The simplest and most commonly used model is the linear additive model. This model assumes that the

overall utility derived from any combination of attributes of a given good or service is obtained from the sum of the separate part-worths of the attributes. Thus, respondent  $i$ 's predicted conjoint utility for profile  $j$  can be specified as follows:

$$U_{ij} = \sum_{k=1}^K \sum_{l=1}^{L_k} \beta_{ikl} x_{jkl} + \varepsilon_{ij}, \quad i = 1, \dots, I, \quad j = 1, \dots, J, \quad (2)$$

where  $I$  is the number of respondents;  $J$  is the number of profiles;  $K$  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  $k$ .  $x_{jkl}$  is such a (0,1) variable that it equals 1 if profile  $j$  has attribute  $k$  at level  $l$ , otherwise it equals 0.  $\varepsilon_{ij}$  is stochastic error term.

The parameters  $\beta_{ikl}$  (part-worth utilities) are estimated by a regression analysis. These parameters can be used to establish a number of things. Firstly, the value of these coefficients indicates the amount of any effect that an attribute has on overall utility – the larger the coefficient, the greater the impact. Secondly, part-worths can be used to calculate the relative importance of each attribute. 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:

$$FI_{ik} = \frac{\max\{\beta_{ik1}, \beta_{ik2}, \dots, \beta_{ikL_k}\} - \min\{\beta_{ik1}, \beta_{ik2}, \dots, \beta_{ikL_k}\}}{\sum_{k=1}^K (\max\{\beta_{ik1}, \beta_{ik2}, \dots, \beta_{ikL_k}\} - \min\{\beta_{ik1}, \beta_{ik2}, \dots, \beta_{ikL_k}\})}, \quad i = 1, \dots, I, \quad k = 1, \dots, K \quad (3)$$

where  $FI_{ik}$  is the relative importance that  $i$ th respondent assigned to the attribute  $k$ .

Given that part worth utilities are calculated at the individual level, if preference heterogeneity is present, the researcher can find it. Therefore, part-worths can be used for *preference-based segmentation*. Respondents who place similar value to the various attribute levels will be grouped together into a segment. Segmentation of conjoint part-worths produces true “benefit segments”. This is something that is sometimes difficult to do using other survey instruments, because respondents have difficulty stating what benefits they actually value the most.

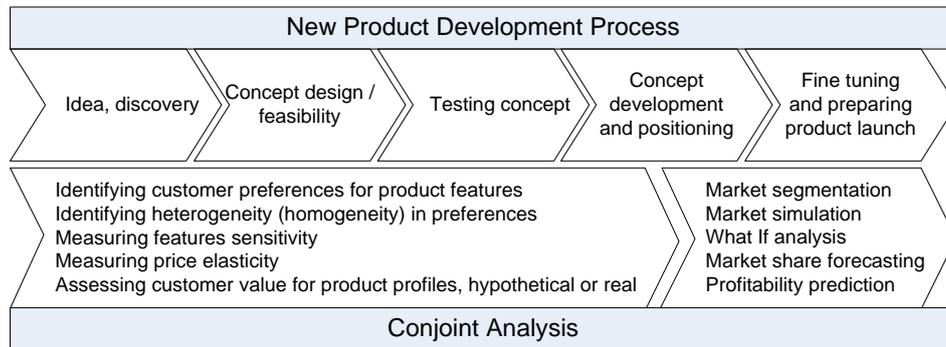
*Overall utility scores* ( $U_{ij}$ ) can be estimated for different combinations of attributes by inserting the appropriate part-worths into Eq. 2. These utility scores can be further used to predict the market shares for each of the defined combinations. For that purpose, a model that uses exponential transformation, also known as the logit model, can be used: A logit model represents the probability that customer  $i$  will choose the  $j$ th profile from a set of  $m$  existing profiles on the market. The logit model is expressed as:

$$P_{ij} = \frac{e^{bU_{ij}}}{\sum_{j=1}^m e^{bU_{ij}}}, \quad i=1,\dots,I, \quad j=1,\dots,J. \quad (4)$$

The exponent  $b$  is used to fine-tune the results so that they reflect the current customer behaviour on the market more accurately. However, the real power of conjoint analysis is the ability to both predict preferences for profiles that weren't rated by the respondents and to perform a *what-if analysis*. This can be done using *conjoint simulation models*.

### 5. CONJOINT ANALYSIS IN THE PRODUCT DEVELOPMENT PROCESS

In the early phases of the product development process most options are still open and there are many degrees of freedom. At each decision and after each phase the degrees of freedom are reduced and the product features are defined in more detail. Conjoint analysis can be very useful in this process (see Fig. 4).



**Fig. 4.** Conjoint analysis in the product development process

It can be summarized that in the product development process, conjoint analysis can be used for multiple purposes:

- To establish a valid model of customer judgments useful in predicting the customer acceptance of any combination of attributes for product newly introduced to market;
- To determine the contribution of attribute levels and their respective values (part-worths) to customer overall preferences;
- To measure price sensitivity and demand elasticity for new product;

- To identify group of customers with similar levels of preference or utility for the various product attributes
- To define product with optimal combination of attributes (desired value map) for each of the identified segments;
- To predict competitive reaction to strategies of introducing a new product.
- To predict profitability and/or market share for new products given the current competitors.

Many studies confirm, that compared to other wide-spread customer needs research methods, like evaluation of single product attributes importance by rating scale or percentage; rank ordering of product attributes; multidimensional measurement etc., the results obtained with conjoint analysis are more detailed, reliable and easier to understand (Pullman & Moore, 1999).

In particular, conjoint analysis defines precisely the performance levels of studied product attributes, whereby ensuring that respondents and researchers understand the research question more clearly. The situation faced by respondents is very similar to their actual purchasing situation. Namely, evaluating the profiles (product concepts) is analogous to evaluating the products in the real market. Furthermore, conjoint analysis allows measuring and analysis of consumer preferences even for individual respondents, thereby enabling the segmentation and clustering of customers. An additional advantage is that a conjoint analysis can be conducted on small samples, which is particular useful in business-to-business settings that are characterized by a relatively small sample size.

## 6. CONCLUSION

Given the increasing intensity of business competition and the strong trend towards globalization, the attitude towards the customer is very important; their role has changed from that of a mere consumer to the role of consumer, co-operator, co-producer, co-creator of value and co-developer of knowledge and competencies. Furthermore, the complex competitive environment in which companies operate has led to the increase in customer demand for superior value

To determine strategically important customer value dimensions, conjoint analysis has been proposed. It was shown that conjoint analysis is very useful method in making optimal pricing and product decisions. The results of conjoint analysis give a good picture about the importance of different product attributes in creating value for customers. Thus it enables to estimate the value created to customers with remarkable accuracy. It is also useful for market segmentation decisions and other improvements that create value for company. Furthermore, models based on conjoint data allow predicting the response of the market to changes in existing product concepts or price before the actual decision is made.

**REFERENCES**

- Dahan E. & Hauser J., (2002), "The Virtual Customer", [in:] *Journal of Product Innovation Management*, Vol. 19, pp. 332–353.
- Gray B.J., Matear S.M., Boshoff C. & Matheson P.K., (1998), "Developing a better measure of market orientation", [in:] *European Journal of Marketing*, Vol. 32, No. 9, pp. 884-903.
- Green P.E. & Srinivasan V., (1990), "Conjoint Analysis in Marketing: New Developments with Implications for Research and Practice", [in:] *Journal of Marketing*, No. 54, pp. 3–19.
- Grunert K.G., Baadsgaard A., Larsen H.H. & Madsen T.K., (1996), *Market orientation in food and agriculture*. Boston, Kluwer Academic.
- Hair J.F., Anderson R.E., Tathan R.L. & Black W.C., (1995), *Multivariate Data Analysis*, Englewood Cliffs, NJ: Prentice Hall.
- Jaworski B.J. & Kohli A.K., (1996), "Market Orientation: Review, Refinement and Roadmap", [in:] *Journal of Market Focused Management*, Vol. 1, No. 2, pp. 119-135.
- Kohli A.K. & Jaworski B.J., (1990), "Market Orientation: The Construct, Research Propositions, and Managerial Implications", [in:] *Journal of Marketing*, Vol. 54, No. 2, pp. 1-18.
- Kuzmanović M., (2006), *Quantitative Methods in Marketing Management: Application of Conjoint Analysis*. Yugoslav Operations Research Society, Belgrade. (In Serbian).
- Kuzmanović M. & Obradović T., (2010), "The Role of Conjoint Analysis in the New Product Price Sensibility Research", [in:] *Management*, Vol. 15, No. 54, pp. 51-58.
- Luce R.D. & Tukey J.W., (1964), "Simultaneous Conjoint Measurement: A New Type of Fundamental Measurement", [in:] *Journal of Mathematical Psychology*, Vol. 1, pp. 1-27.
- Mizik N. & Jacobson R., (2003), "Trading Off between Value Creation and Value Appropriation: The Financial Implications of Shifts in Strategic Emphasis", [in:] *Journal of Marketing*, Vol. 67, No. 1, pp. 63-76.
- Narver J.C. & Slater S.F., (1990), "The Effect of a Market Orientation on Business Profitability", [in:] *Journal of Marketing*, Vol. 54, No. 4, pp. 20-35.
- Parasuraman A., (1997), "Reflections on Gaining Competitive Advantage Through Customer Value", [in:] *Journal of Academy of Marketing Science*, Vol. 25, No. 2, pp. 154-161.
- Parasuraman A., Zeithaml V.A. & Berry L.L., (1988), "Servqual: A Multi-item scale for measuring consumer perception of Service Quality", [in:] *Journal of Retailing*, No. 64, pp. 12-40.
- Pullman M.E. & Moore W.L., (1999), "Optimal service design: integrating marketing and operations perspectives", [in:] *International Journal of Service Industry Management*, Vol. 10, No. 2, pp. 239–260.
- Ravald A. & Gronroos C., (1996), "The value concept and relationship marketing", [in:] *European Journal of Marketing*, Vol. 30, No. 2, pp. 19-30.
- Sánchez R. & Iniesta M.A., (2006), "Consumer Perception of Value: Literature Review and a New Conceptual Framework", [in:] *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, No. 19, pp. 40-48.
- Slater S.F. & Narver J.C., (1999), "Market-Oriented is More than Being Customer-Led", [in:] *Strategic Management Journal*, Vol. 20, No. 12, pp. 1165-1168.
- Smith J.B. & Colgate, M., (2007), "Customer Value Creation: A Practical Framework", [in:] *Journal of Marketing Theory & Practice*, Vol. 15, No. 1, pp. 7-23.
- Spiteri J.M. & Dion P.A., (2004), "Customer Value, Overall Satisfaction, End-User Loyalty, and Market Performance in Detail Intensive Industries", [in:] *Industrial Marketing Management*, Vol. 33, No. 8, pp. 675-687.

Walters D. & Lancaster G., (1999), "Value-based marketing and its usefulness to customers", [in:] *Management Decision*, Vol. 37, No. 9, pp. 679–708.

Wittink D.R., Vriens M. & Burhenne W., (1994), "Commercial use of conjoint analysis in Europe: results and critical reflections", [in:] *International Journal of Research in Marketing*, No. 11, pp. 41 – 52.

Woodruff R.B., (1997), "Customer Value: The Next Source for Competitive Advantage", [in:] *Journal of Academy of Marketing Science*, Vol. 25, No. 2, pp. 139-153.

## **BIOGRAPHICAL NOTES**

**Marija Kuzmanović** is teaching assistant in Operations Research and Game Theory at the University of Belgrade, Faculty of Organizational Sciences, Serbia. She obtained MSc degree from Department of Operations Research and Statistics, Faculty of Organizational Sciences. Currently she is completing her PhD thesis. Topics of her research include analysis and application of mathematical modeling, conjoint analysis, game theory and other quantitative methods in marketing and management.

**Bisera Andrić Gušavac** is teaching assistant in Operations Research at the University of Belgrade, Faculty of Organizational Sciences, Serbia. She obtained MSc degree in industrial engineering from Ecole Centrale Paris. Her research interests include analysis and optimization of industrial and logistic systems, and mathematical modeling.

**Milan Martić** is professor in Operations Research, Performance Measurement Methods and Game Theory at the University of Belgrade, Faculty of Organizational Sciences, Serbia. His research interests include analysis and application of mathematical modeling, data envelopment analysis and game theory.