Marija Anđelković PešićUniversity of Niš
Faculty of Economics
Department of Business
Management**Vesna Janković Milić**University of Niš
Faculty of Economics
Department of Business
Management**Aleksandra Anđelković**University of Niš
Faculty of Economics
Department of Business
Management

BUSINESS PROCESS MANAGEMENT MATURITY MODEL - SERBIAN ENTERPRISES' MATURITY LEVEL

Model zrelosti upravljanja poslovnim procesima -
nivo zrelosti preduzeća u Srbiji

Abstract

Business process management maturity model enables description of "as-is" enterprise's state, in terms of presence and acceptance of process approach. The heart of this model includes five factors or levers, critical for successful implementation of business process management. These factors are: strategic approach, process management, technology, employee management, and business culture. The above-mentioned factors influence the level of enterprise's maturity. At each level, an enterprise is in a specific state: silo, tactical integration, process orientation, optimized enterprise, and intelligent network. When maturity factors are analyzed simultaneously with maturity levels one can formulate two-dimensional business process management maturity model. From the perspective of process management maturity, the state of Serbian economy is also shown in the form of two-dimensional model.

Key words: *management, business processes, maturity, levels, factors.*

Sažetak

Model zrelosti upravljanja poslovnim procesima omogućava dijagnostikovanje trenutnog stanja preduzeća, u smislu zastupljenosti i prihvaćenosti procesnog pristupa. U srcu ovog modela nalazi se pet faktora, kritičnih za uspešnu implementaciju upravljanja poslovnim procesima. To su: strateški pristup, upravljanje procesima, tehnologija, upravljanje zaposlenima i poslovna kultura. Navedeni faktori utiču na nivo zrelosti preduzeća. Na svakom nivou preduzeće se nalazi u određenom stanju: silosi, taktička integracija, procesna orijentacija, optimizirano preduzeće, inteligentna mreža. Vođeci se faktorima i nivoima zrelosti moguće je formulisati dvodimenzionalni model upravljanja poslovnim procesima. U vidu dvodimenzionalnog modela prikazano je i stanje preduzeća u Srbiji, posmatrano sa aspekta zrelosti upravljanja procesima.

Ključne reči: *upravljanje, poslovni procesi, zrelost, nivoi, faktori.*

Introduction

Successful enterprises are characterized by a constant striving towards excellence in all areas of business, which is achieved by continuous improvement of business activities. Since the activities constitute the business processes, the assumption is that high performances and business excellence may be achieved through appropriate business process management.

Business process management is defined as a holistic management approach that focuses on identifying, defining, implementing, measuring, monitoring, analyzing, and continual improving of business processes [9]. This approach assumes top management involvement and support, because its implementation starts from the top and spreads vertically and horizontally through the enterprise [2]. Top management support is necessary but not sufficient, since all employees have to accept this management change.

The importance of business process management has been an inspiration and challenge for many authors. The first one, who actually introduced a model for business process management implementation is Watts Humphrey [13]. Since this model points out the path an enterprise has to pass in order to reach process management maturity, it is called Capability Maturity Model. The basic assumption of this model is that enterprises whose

managers understand the processes and systematically manage their realization are more capable to respond to customer demands, compared to traditionally managed enterprises [12].

Today there are a lot of models that describe maturity of an enterprise in terms of business process management. If one ignores minor differences between them, all business process maturity models describe the evolutionary path that leads an enterprise to the state of maturity, when its managing is based on processes [17]. While describing the maturity levels, these models point out the factors significant for the transition from lower to higher maturity level.

Characteristics and principles of business process maturity models

As it is mentioned, Humphrey introduced the first maturity model. After Humphrey, the significance of business process management maturity was emphasized by Maull, Tranfield, and Maull [14]. They studied the programs of reengineering in 33 enterprises and set out three reengineering programs: the strategic, process, and cost-based. According to them, cost reduction and process approach are very important for starting the journey towards process maturity, but strategic aspect is necessary for reaching the high level of maturity.

One of the latest models was developed by Rosemann and de Bruin [16]. This model includes observation of five factors' influence during five phases an enterprise has to pass in order to reach maturity of business process management. It is called Business process management maturity model. Another business process maturity model appeared in 2006 and was promoted by Weber, Curtis, and Gardiner [20]. Hammer [11] also accepts the phase approach to process management, and emphasizes that all the previous stages must be fully completed before moving to the next phase (to the higher level of maturity). Hammer's model clearly highlights the difference between process maturity and the enterprise maturity. In order to analyze process performances, the model takes into account the maturity of five drivers, and they are: design, performers/implementers, owner, infrastructure, and measures. When

it comes to an enterprise's maturity, Hammer emphasizes four skills, and they are [15]: leadership, culture, expertise, and way of managing. However, the models proposed by Curtis and Hammer are based on the Rosemann and de Bruin model, and are very similar. Therefore the following pages will point out the characteristics of *Business process management maturity model (BPMMM)*, formulated by Rosemann and de Bruin [3].

Business process maturity models are based on the following principles [7]:

- Process performances must be evaluated to identify its ability to contribute to the achievement of an enterprise's goals,
- Capable processes cannot survive if an enterprise is not at an appropriate level of maturity,
- Process improvement must be accompanied by organizational changes and changes in managing,
- Each maturity level is the basis for further improvements.

Identification of business process maturity level

The maturity model includes five stages and five factors of process maturity [18]. The stages are actually levels achieved by an enterprise during the implementation of process orientation. Through identification of maturity factors and their impact on business processes, it is possible to determine in which stage of maturity an enterprise is and which factors should be improved to ensure the path to business excellence [19].

Maturity level of an enterprise is determined by the factors whose influence prevails, which means that not all factors have equal influence on all levels of maturity. According to the Delphi study, conducted by De Bruin, the factors of maturity are [8]:

- Strategic approach,
- Process management (methods),
- Information technology and standards,
- Employee management,
- Business culture.

Enterprises that are at the first level are focused on achieving local optimum. Therefore this first level is marked as silo state. If managers act as promoters of change

in business culture, the awareness about the importance of process orientation will be a part of value system [2]. So it can be said that the key factor or condition lever to reach the second level of maturity is *business culture*. The application of identical measures contributes to unification of the reports required for the analysis of process flow and results, and information technology makes it easier to share them, which contributes to better decision-making. This is why *information technology* is seen as a second key lever of change from silo to the next level called tactical integration.

The identification of processes is a condition for process orientation implementation. After identifying, it is necessary to provide harmonization of activities and resources needed for their realization, as well as continuous measurement, improvement, and control. Therefore, *process management* is considered a significant factor for the transition to the next level - process orientation.

However, the identification of processes and the introduction of measures and information technology do not matter if training of employees for process realization is missing. Therefore, a critical lever of change for reaching the next maturity level or transition to the state called optimized enterprise is *employee management*. Employee education and training, their knowledge and skills, and communication, as well as an adequate compensation system affect the speed of reaching the optimization state.

As the term itself indicates, the state of optimization means that the enterprise has adopted a process approach. However, since modern conditions impose the need for establishment of long term cooperation with partners, process approach should be expanded beyond the borders of the enterprise. To make it possible to transform the enterprise into an intelligent network, as the last maturity level, long-term strategic approach is required, and so the most important lever of change is *strategy (strategic approach)*. Therefore, in order to achieve this state an enterprise must define the processes based on the strategy, because in this way they will be directed towards the implementation of the same. The last, the fifth maturity level is a utopia for most enterprises, but also the goal they have to strive for. In this sense, it can be said that an

effort an enterprise makes to move from lower to higher maturity level is important in and of itself.

This structure of factors is justified by the research that is related to the problems in the implementation of process orientation. The most frequent problems according to this research are [5]:

- “Resistible” business culture,
- Insufficient or inadequate process performance measures, as well as information system,
- Insufficient or no cooperation between organizational units,
- Lack of process owners,
- Local compensation system (instead of at the process level, as a whole).

Business Process Maturity Model highlights important elements for reaching the maturity of business process management. However, the fact that it does not emphasize the links among those elements can be considered as a limitation of this model. Also, presented model simplifies the maturity of business processes. However, the factors that determine the maturity level are not linear, in the sense that certain factors may indicate that the enterprise is at one, while the analysis of other factors may indicate another maturity level. Therefore it can be said that business process maturity model is not one-dimensional, but two-dimensional, where dimensions of the model are previously mentioned factors and levels of process maturity. In this case the level is viewed as a state in which the enterprise is, while the factor is explained as lever that contribute to the transition from one state to another [10].

The analysis of process approach presence in Serbian enterprises

Bearing in mind that the theory suggests that the factors which determine the business process maturity level do not have equal importance in different stages or levels of maturity, nor must be harmonized, it is desirable to identify which factors are dominant at the specific maturity level, or presence of which is a prerequisite for achieving a specific maturity level. As it is already mentioned, the theoretical study shows the following schedule of factors

for each maturity level in terms of domination of their importance:

- In the second stage dominate business culture and information technology,
- In the third stage dominates process management,
- In the fourth stage dominates employee management,
- In the fifth stage dominates strategy.

The theoretical research of process orientation issues has been approached with the task of identifying the activities that management should undertake, as well as the factors whose impact is particularly important for reaching a higher maturity level of business process management. In order to verify whether and to what extent the practice of Serbian enterprises deviates from the theoretical generalization, the research, including 80 randomly selected enterprises, has been conducted. The sample size is not sufficient to declare the sample as representative, but it can certainly be considered informative for gaining insight into presence of process orientation in the enterprises in Serbia. This means that the task of the analysis of process management maturity in Serbia is to determine in which state (silo, tactical integration, process orientation, optimized enterprise, and intelligent network) is the largest number of enterprises or what is the distribution of the enterprises by the state or stage of maturity. Also, the task of research is the assessment of the level at which each of the levers of change (strategy, processes, technology, employees, culture) is. Based on this information, at the level of individual enterprises, managers can see if all the factors/levers are at the same development level and, possibly, which of the factors are “behind” compared to the others, and consequently focus on their correction and improvement. This will either prove or disprove the hypothesis that the *business process maturity model is not linear*.

Grouping of enterprises in the sample was carried out starting from different criteria: enterprise size (number of employees), the origin of the capital (whether an enterprise capital is mostly domestic or foreign), and organizational structure. The structure of the sample, according to these criteria, is presented in the tables below.

Table 1: Sample structure according to the origin of the capital and size of enterprise

Capital origin	Number of employees			Total
	Less than 50	51-250	Over 250	
Domestic	21	19	8	48
Foreign	20	8	4	32
Total	41	27	12	80

Table 2: Sample structure according to the origin of capital and organizational structure

Capital origin	Organizational structure					Total
	Simple	Functional	Division	Team	Matrix	
Domestic	14	16	8	8	2	48
Foreign	14	11	3	2	2	32
Total	28	27	11	10	4	80

Table 3: Sample structure according to the size of enterprise and organizational structure

Organizational structure	Number of employees			Total
	Less than 50	51-250	Over 250	
Simple	28	0	0	28
Functional	13	14	0	27
Division	0	8	3	11
Team	0	5	5	10
Matrix	0	0	4	4
Total	41	27	12	80

Data collection was done by interviewing top management. In addition, the task of managers was to identify the level of each factor of business process management maturity. For analysis of data the attribute description of the factors was replaced with numerical, ranging from 1 to 5. In doing so, it is assumed that each level automatically includes everything that has been achieved at levels that precede it. Part of the questionnaire relating to the description of factors maturity level is shown in Table 4.

Identification of the enterprise maturity level is based on the average assessment of maturity level of each factor. Since the lowest average score of maturity at the enterprise level is 2.20 (meaning that there are no enterprises at the first level, or that managers are at least aware of the importance of process orientation), and the highest 4.60, the following interval groups that reflect the maturity levels of enterprises and the identified number of enterprises inside these groups are defined (Table 5):

- Up to 2.50 – the second maturity level,
- From 2.51 to 3.50 – the third maturity level,
- From 3.51 to 4.50 – the fourth maturity level and
- Over 4.51– fifth maturity level.

Table 4: Description of the levels of business process maturity factors

Maternity levels - states Factors	Silo	Tactical integration	Process orientation	Optimized enterprise	Intelligent network
Information technology	Information technology is not used for the exchange of information	Information technology is used to exchange information within the organizational units	Information technology is used to exchange information vertically	Information technology is used to exchange information horizontally	Information technology is used to exchange information with partners
Process management	Processes are not defined	Key processes are defined	All the processes within the organizational units are defined	Processes that connect several organizational units are defined	Processes that connect the enterprise with partners are defined
Employee management	Employees are treated only as executives	Employees are responsible for collecting data about the activities they carry out	Employees continuously improve their capabilities	Employees have a possibility to express their ideas	Employees are seen as the owners of the activities they perform
Strategy	The strategy is known only to top managers	All managers are familiar with the strategy	All employees are familiar with the strategy, but top managers create it	All employees are familiar with the strategy, but only managers participate in the creation	All employees are familiar with the strategy and involved in its creation
Business culture	There is no awareness of managers about process approach importance	Managers are aware of process approach importance, but not all employees	Managers and all employees are aware of process approach importance	Managers and employees act in accordance with process approach	Managers and employees promote process approach

Table 5: Sample structure according to the business process maturity level

Factors	Second level	Third level	Forth level	Fifth level
Number of enterprises	18	36	21	5
Relative structure	22.50%	45.00%	26.25%	6.25%

One segment of the data analysis refers to the examination of process management maturity level dependency of the independent variables – the capital origin, enterprise size, and organizational structure. The application of χ^2 test showed that the maturity level does not depend on capital origin, but that depends on enterprise size (Table 6) and organizational structure (Table 7).

Table 6: Distribution of enterprises according to maturity levels and enterprise size

Maternity level	Number of employees			Total
	Less than 50	51-250	Over 250	
Second level	15	2	1	18
Third level	15	15	6	36
Forth level	11	8	2	21
Fifth level	0	2	3	5
Total	41	27	12	80

Maturity level depends on the enterprise size, because the realized level of significance is less than 0.05, while p -value is equal 0.005 (calculated value of the χ^2 test

statistics is 18.712). For small enterprises dominant is the second or the third maturity level, for medium-sized as well as for large enterprises the third level. However, a significant number of large enterprises (25%) have reached the fifth maturity level, as opposed to small and medium-sized enterprises.

Table 7: Distribution of enterprises according to maturity level and organizational structure

Maternity level	Organizational structure					Total
	Simple	Functional	Division	Team	Matrix	
Second level	11	5	2	0	0	18
Third level	9	15	5	5	2	36
Forth level	8	7	3	2	1	21
Fifth level	0	0	1	3	1	5
Total	28	27	11	10	4	80

The value of χ^2 test for testing dependence of maturity level from organizational structure is 23.782, while the significance level is 0.022, which is less than 0.05. This suggests that maturity level depends on organizational structure.

For further testing the maturity of process management in the enterprises in Serbia, it is desirable to analyze the impact of these independent variables on each factor of maturity. As it is previously determined that maturity level does not depend on the capital origin, further analysis is

based on the examination of factors dependence on the enterprise size and organizational structure.

The result of χ^2 statistics shows that valuing process management as a factor of maturity of the enterprises in Serbia depends on enterprise size (Table 8). The value of χ^2 statistics which is equal 18.786 and p -value of 0.005 represent the basis for confirmation of dependency.

Table 8: Distribution of enterprises according to process management maturity level and enterprise size

Number of employees	Process management maturity levels				Total
	Second	Third	Forth	Fifth	
Less than 50	14	21	6	0	41
51-250	3	15	6	3	27
Over 250	1	4	3	4	12
Total	18	40	15	7	80

The significance of employees (employee management) as maturity factor also depends on enterprise size (Table 9). Statistics of χ^2 test was used again in the conclusion procedure, where realized significance level of 0.003 confirms the statistically significant dependence of employee management maturity level, as maturity factor, from the enterprise size, again in favor of large enterprises.

Table 9: Distribution of enterprises according to employee management maturity level and enterprise size

Number of employees	Employee management maturity levels				Total
	Second	Third	Forth	Fifth	
Less than 50	8	14	4	15	41
51-250	2	2	13	10	27
Over 250	0	3	6	3	12
Total	10	19	23	28	80

The analysis has shown that the consideration of information technology as a maturity factor also depends on the enterprise size (Table 10). The value of χ^2 test is 21.884, while the p -value (0.001) is lower than the defined level of significance (0.05), which confirms the previously mentioned dependence.

Table 10: Distribution of enterprises according to information technology maturity level and enterprise size

Number of employees	Information technology maturity levels				Total
	Second	Third	Forth	Fifth	
Less than 50	20	13	8	0	41
51-250	4	13	8	2	27
Over 250	7	2	0	3	12
Total	31	28	16	5	80

The analysis has shown that the organizational structure of enterprises, as an independent variable, has influence on the process management maturity level and the business culture maturity level, as factors of maturity. This means that process management and business culture have different importance depending on the organizational structure (Tables 11 and 12). In both cases the p -value is less than 0.05, thus confirming the dependence of process management maturity level ($p = 0.034$) and business culture maturity level ($p = 0.048$) of the organizational structure.

Table 11: Distribution of enterprises according to process management maturity level and organizational structure

Organizational structure	Process management maturity levels				Total
	Second	Third	Forth	Fifth	
Simple	10	15	3	0	28
Functional	6	15	5	1	27
Division	2	4	3	2	11
Team	0	5	3	2	10
Matrix	0	1	1	2	4
Total	18	40	15	7	80

Table 12: Distribution of enterprises according to business culture maturity level and organizational structure

Organizational structure	Business culture maturity levels				Total
	Second	Third	Forth	Fifth	
Simple	5	18	5	0	28
Functional	0	19	8	0	27
Division	0	9	2	0	11
Team	0	4	5	1	10
Matrix	0	3	1	0	4
Total	5	53	21	1	80

In order to check if the situation in the enterprises in Serbia, in terms of dominance of certain maturity factors, coincides with the theoretical generalizations of authors dealing with the analysis of business process maturity, enterprises were grouped based on dominance of the factors at the maturity levels. Grouping was done according to the highest frequency or the number of enterprises for maturity factors. The dominant factors are shown in Table 13.

Table 13: Dominant factors for the maturity levels

Maturity levels Factors	Second	Third	Forth	Fifth
Strategy	2 (11)	3(17)	4(10)	4 (5)
Process management	2(13)	3(27)	4(9)	5(4)
Employee management	2(10)	4(16)	5(13)	5(4)
Information technology	2(14)	3(17)	4(12)	5(5)
Business culture	3(13)	3(26)	3(13)	4(3)

By grouping enterprises according to the dominant factors and comparison with theoretical generalizations, it can be concluded that the factors which dominate in Serbian enterprises at different maturity levels are almost identical to the distribution that theory suggests. Given that in the sample there were no enterprises at the first level of maturity, there is no empirical result for the same, but for all other levels the match can be observed. The exceptions are the fourth and fifth level, where empirical results show the same dominance of two factors (Table 14).

Table 14: Dominant factors comparison

	Theoretical generalization	Empirical results
Second level	<i>Business culture and Information technology</i>	Information technology
Third level	Process management	Process management
Forth level	Employee management	Employee management and <i>business culture</i>
Fifth level	Strategy	Strategy and <i>information technology</i>

This slight difference indicates that the business culture is the factor which is harder to adjust (improve) in Serbian enterprises compared to the enterprises in developed countries, as well as that the managers, beside strategy, consider information technology as highly important for reaching the fifth maturity level. This is acceptable given that the information technology is important for

establishing partnerships with other enterprises, and not only at the enterprise level.

The following table shows that all factors, according to the research, are correlated (interdependent). This suggests that, despite the possibility that they are at different maturity levels, it is desirable to improve them simultaneously.

Based on the values of Spearman correlation coefficient, shown in Table 15, it can be concluded that the greatest degree of agreement is between the factors: process management and business culture (correlation coefficient is 0.501), and employee management and information technology (correlation coefficient is 0.463). Such research results, in terms of the interdependence of these factors, have been confirmed in studies by other authors, who showed that the change of business culture is the factor of successful implementation of process orientation [1]. On the other hand, it can be said that learning about the effects of process orientation is a way to initiate the change of business culture. The problem for most enterprises in Serbia may be the fact that the business culture is a dominant factor in the enterprises that are at the fourth maturity level, which shows a significant lag and may jeopardize the effects of process orientation. The correlation coefficient between the factors of employee management and information technology is also high, compared to the others. This correlation is also pointed by some authors. According to Baloh and Trkman [4] information technology has a great influence on communication, work, and employee learning, but at the same time, employees must have the necessary knowledge and skills to use it.

Table 15: Values of Spearman correlation coefficient between business process management maturity factors

Factors		Strategy	Process management	Employee management	Information technology	Business culture
Strategy	Value (sig. level)	1.000 .				
Process management	Value (sig. level)	0.370 (0.001)	1.000 .			
Employee management	Value (sig. level)	0.386 (0.000)	0.383 (0.000)	1.000 .		
Information technology	Value (sig. level)	0.227 (0.043)	0.332 (0.003)	0.463 (0.000)	1.000 .	
Business culture	Value (sig. level)	0.301 (0.007)	0.501 (0.000)	0.243 (0.030)	0.202 (0.073)	1.000 .

Conclusion

Process management maturity model should help managers to identify the state in which the enterprise is and to eventually take the initiative to improve processes management and to increase the level of management maturity. According to some authors [15], the separation of process maturity from the process management maturity is very important. If one or a small number of critical processes have high maturity level, it does not necessarily mean that the process management in the enterprise is at a high maturity level. One of the reasons for specific process maturity may be the heroic effort of individuals, which may last shortly. However, indicators of maturity of at least one process refer that the enterprise is on track to reach higher business process management maturity level.

One of the criticisms of the process management maturity models based on the Humphrey's model refers to the focus on practice of managing all processes, and not only the key ones [6]. However, this criticism is completely unfounded. The goal of business process maturity models is to transfer the philosophy of process management improvement to the enterprise as a whole. To make this possible it is not enough just to manage the key processes, but also all the others, which support the realization of the key ones (supporting processes). A significant limitation of business process maturity models is the fact that they do not offer a methodological approach which managers could use as some kind of road map for achieving higher maturity levels. Therefore, these models belong to the descriptive models and their effects can be significant only with the parallel application of appropriate methodological model. In this sense, one of the future challenges may be imposed formulation of the process management model, which will, except describing the possible maturity states of the enterprises, include methodological approach for increasing the level of business process management maturity.

The research results show that the majority of enterprises in Serbia are at the third maturity level (45%), but there are a significant number of those that are at the fourth level. Moreover, among these enterprises dominate the large enterprises. At the fifth maturity level there is 25% of enterprises from this group. The percentage of

medium-sized enterprises is significantly lower (7%), while at the fifth level of maturity there are no small enterprises. Since it has been found that the maturity level depends on organization structure, it is evident that, in terms of maturity level, team structure provides the best results. The analysis showed that the capital origin is not a significant factor of process management maturity level.

Based on the research results, it can be concluded that the managers of the enterprises in Serbia are aware of the importance of process orientation and dominance of process management maturity factors in various stages in the process of achieving business excellence, but that the business culture, which should be transformed in the first phase, gains the importance only in the fourth. One can therefore conclude that this factor is a significant constraint for the implementation of process based management in the enterprises in Serbia.

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Marija Andelković Pešić

is an Assistant Professor at the Faculty of Economics, University of Nis, for narrow scientific field Business Management. She was born in Leskovac in 1978. She graduated in 2001 at the Faculty of Economic in Nis, as a student of generation. As a student, she won few prizes, among them prize of town Niš and University of Niš. She has participated in few projects, financed by Ministry of Science of Republic of Serbia. Master and doctoral thesis she defended at the Faculty of Economics in Belgrade in 2004 and 2009, respectively. Three times she was engaged as a researcher at the University for Economics and Business Administration, Department for Production Management, Wien, Austria. Her key interest areas are: quality management, process management, cost management. So far, she has published more than 100 papers in journals and proceedings from the conferences (national and international) and 4 monographs.

Vesna Janković-Milić

is an Assistant Professor at the Faculty of Economics, University of Nis, for narrow scientific field of Economic statistics, the application of mathematical and statistical methods in economic research. She was born in Belgrade in 1974. The MSc degree she gained at the Faculty of Economics, University of Belgrade and PhD degree at the Faculty of Economics, University of Nis. She has published three monographs as well as many papers in scientific and professional journals and has participated in research conferences at home and abroad. She worked as a researcher on projects funded by the Ministry of Education and Science of Republic of Serbia. She participated in numerous seminars and professional training abroad.

Aleksandra Andelković

is a Teaching Assistant at the Faculty of Economics, University of Nis, for narrow scientific field of Economic statistics. She was born in Leskovac in 1983. She graduated in 2007 at the Faculty of Economic in Nis. As a student, she won few prizes, among them studentship of town Nis and Hemofarm Group and prize of organization "Travel to Europe". Master thesis "Supply chains development with support the methods of statistical analysis" she defended at the Faculty of Economics in Nis in 2010. Today, she is PhD student at Faculty of Economic in Nis. Her key interest areas are: strategic management of logistics, international logistics, supply chains, international marketing, and marketing channels. So far, she has published more than 20 papers in journals and proceedings from the conferences (national and international).