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UDK: 658.8:659.2 ; 659.113.25 ID: 196825868 **Review Article**

CAN MARKETING COMMUNICATIONS AFFECT CONSUMER BEHAVIOR?

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Abstract: *This paper focuses on the development and testing the effect of different factors of marketing communications on customer's response. Study provides the insight into how consumers respond to the different communication factors. The model incorporates facets of antecedents of marketing communication factors including factors related to the communication, customer's knowledge, customer's goals and situational factors. The links between these constructs are explored and it is argued that marketing communications factors play a critical role in customer's response. Empirical data was gathered from a sample of Slovenian companies. Results show that selected factors of marketing communications significantly determined customer response. Managerial implications are discussed along with directions for further research.*

Key words: *marketing communications, customer's response, consumer behaviour*

Summary: Top managers assessed that these four factors can affect customer's response. The study confirms that there is an association between all four constructs (customer's factors, customer's goals, communication factors, situational factors) and customer's response. We found the highest correlation between the communication construct and customer's response. A statistical test did not support the hypothesis that a positive relationship exists between all four constructs and customer's response. But with statistical test we confirm a positive relationship between one specific marketing communications factor or construct (i.e. communication factor) and customer's response and from the results we can confirm that a set of communication factors influences customer's response. This paper attempted to provide some interesting perspectives as to how to view marketing communications and how different factors can be associated with customer's response. Managers can develop such marketing communication programs that can be competitive in today's environment.

1. INTRODUCTION

Consumer buying behaviour is the study of how and why people consume products and services. It also investigates behaviour which is the earlier process of buying, the process of purchasing and the next purchase after buying. Hence, consumer buying behaviour is influenced by different factors, like cultural, social, personal and psychological factors. A successful company marketer knows and needs to analyze very well all the factors that affect consumer behaviour [16; 17].

The marketing communication theory implies that studying the effects of marketing communications on customer's response require understanding how organizational customers (i.e. companies) under different circumstances, exposed to different situational factors and to different types of communications respond to these factors.
One of the most important changes in today's marketplace is the increased number and diversity of communication options available to marketers to reach customers. Marketing

communications represent the voice of a brand and the means by which companies can establish a dialogue with consumers concerning their product offerings. Marketing communications allow marketers to inform, persuade, incite, and remind consumers. Marketing communications can provide detailed product information or ignore the product all together to address other issues [10].

A paper provides a perspective of how to analyse the factors affecting customer's response.

The guidelines that emerge from this approach should be particularly relevant for marketing managers in industry. The paper closes with the implications of the findings and highlights promising future research avenues.

Three priorities guide our paper: 1) a more complete view as to the role of marketing communications; 2) a conceptual framework by which the customer's response is affected, and 3) the empirical investigations of tested relationships among constructs. We will classify and analyze different marketing communications factors influencing the customer response (i.e. factors related to the communication). The links between them will be explored and it will be argued that marketing communications factors play a critical role in customer’s response. These hypotheses will be tested using liner regression. We will find significant liner relationship between the independent variable (marketing communications) and the dependent variable (customer’s response).

2. CUSTOMERS RESPONSE TO COMMUNICATIONS FACTORS

2.1. Marketing Communications Factors

Customers obviously vary on a host of different characteristics - demographic (e.g., age, gender, race, etc.), psychographic (e.g. attitudes towards oneself, others, possessions, etc.), behavioural (e.g. brand choices, usage, loyalty, etc.) - that often serve as the basis of market segmentation and the development of distinct marketing programs [12; 7].

But customers may differ in their prior knowledge, especially in terms of what they know - moving from the general to the specific - about 1) the product or service category, 2) the company or organization that makes the product or provides the service for the brand, 3) the brand, and 4) past communications for the brand [10; 4; 8]. In terms of the classic “hierarchy of effects”, customers’ goals may range from a need or desire to: 1) make a purchase in the category; 2) identify appropriate candidate brands; 3) obtain benefit or feature information about specific brands; 4) judge or evaluate the merits of certain brands; or 5) buy chosen brands.

The challenge for business-to-business marketer is to create a well-planned and comprehensive marketing communication program in order to achieve company objectives. We must integrate and coordinate different communication tools to achieve the desired results. The instruments of marketing communications are regarded as advertising, sales promotion, public relations, direct marketing and personal selling [9].

Communication factors relate to characteristics of their very communication options. The basic aspects of a marketing communication are extremely important in how they interact with consumer characteristics and the surrounding context to create different responses. In a more specific sense, marketing communications can also vary in their message content about the brand (“what is said”) and creative execution (“how it is said”). A communication may contain numerous brand-related information (e.g. a detailed print ad or direct mail piece) [10].

Situational factors relate to all the factors external to the communication itself that may affect consumers and impact communication effectiveness. Representative factors include the exposure location; the extent and nature of competing stimuli (advertising or otherwise) at communication exposure; the amount of time lag involved with measurements of response or outcomes. Broadly, situational factors primarily relate to place and time [10].

2.2. Customer's Response

»Consumer response reflects the state changes that a consumer experiences – either temporally or on a more permanent basis - as a result of exposure to a marketing communication. Consumer response to any marketing communication can be broken down into a host of different categories reflecting the process or outcome associated with exposure to the communication. In terms of processing, both cognitive and affective responses can occur. These responses may vary in terms of their level of abstraction (specific vs. general), evaluative nature (negative, neutral, or positive valence)« [10, p. 828-829].

Beerli and Santana [2] have suggested that the best way to evaluate individual responses to advertising/promotion is based on the three dimensions (stages) of cognition, affection and conation. The hierarchy of effects model proposed by Lavidge and Steiner [11] uses the same three dimensions to form its underlying mechanism. The hierarchy of effects model, or variants of it, has dominated the advertising literature since the 1960s [15], and even then the emphasis has traditionally been on purchasing behaviour measures such as sales, market share, loyalty and brand choice. Many marketing researchers in fact have treated conation as the consumer's behavioural response [13]. Intention to buy is one of the most widely used measures for the conative stage [2]. Despite the hierarchy in recent years being criticised because the effects may not necessarily follow a temporal sequence [15], it continues to be applied only in advertising, but also in other instruments of marketing communications too. The customer's response to different marketing communications instruments can be put into three functional phrases: framing perception, enhancing experience, and organizing memory [5]. The marketing communications theory implies that studying the effects of individual marketing communications requires understanding how different types of consumers respond to different brand or communication-related tasks or measures. We review each of these four sets of factors in turn [10].

Communication factors relate to characteristics of the communication option under consideration itself. The basic aspects of a marketing communication are extremely important in how they interact with consumer characteristics and the surrounding context to create different responses. In a more specific sense, marketing communications can also vary in their message content about the brand ("what is said") and creative execution ("how it is said"). A communication may contain much brand-related information (e.g. a detailed print ad or direct mail piece). Consumer response reflects the state changes that a consumer experiences – either temporally or on a more permanent basis - as a result of exposure to a marketing communication [10].

3. RESEARCH METHODOLOGY

3.1. Characteristics of the Sample

The main research instrument for empirical investigation, e.g. a questionnaire, was developed on the derived theoretical basis. The covering letters with questionnaires were mailed to the corporate directors of 150 top Slovenian enterprises. We choose the strata

based on the annual net profit. The survey was conducted in January, 2012. During the four-week period following the mailing, a total of 37 responses were received and gave the response rate of 24,7%. The results presented in this paper are related to the sample of 37 respondents. The collected empirical data were processed with SPSS 17.0, where the emphasis was given to descriptive statistical analysis. We intend to use the regression analysis and hypothesis testing. The regression analysis and hypothesis testing produced very modest research findings because of the few companies in the sample.
Some of the possible limitations of the survey results should be noted. First, the low response rate might be considered a concern, but in fact, it is expected in organizational research as opposed to consumer research [6]. When small sample sizes are being employed, when each subpopulation of interest has fewer than 30 respondents, we should be very careful to ensure that any inferences are appropriate given the data collection. But in this paper a small sample represents a high proportion of our population and such concerns are less relevant [3]. We have identified and assessed five specific marketing capabilities. This excluded any assessment of other marketing capabilities such as promotion, channels of distribution and customer relationship management that might usefully be examined by future researchers.

The relevant data of the companies were provided mainly by members of the managing boards (70,3% of cases). Other respondents appeared in not more than three companies.

Table 1 - Position of respondents in the companies

Position in the company	Frequency	Percent (%)
Members of the managing board	26	70,3
Head executive	4	10,8
Counselling specialist	2	5,4
Business consultant	2	5,4
Other	3	8,1
Total	37	100,0

The companies included in the sample are distributed according to industries (see Table 2).

Table 2 - Distribution of the companies in the sample according to industries

Industry	Frequency	Percent (%)
Production of industrial products	11	29,7
Trade	9	24,3
Production of consumer products	6	16,2
Business services	6	16,2
Services for final consumer	5	13,5
Total	37	100,0

The sample consists of one company (2,7%) with less than 100 employees, 35,1% of the companies with less than 500 employees but more than 100, 35,1% of the companies with the number of employees bigger than 500 but smaller than 1001, and 27,0% of the companies with more than 1000 employees.

Table 3 - Size of the respondents companies

Number of employees	Frequency	Percent (%)
51-100	1	2,7
101-500	13	35,1
501-1000	13	35,1
More than 1000	10	27,0
Total	37	100,0

Then respondents in the surveyed companies were asked about their largest sales geographic region. The respondents had the possibility to choose among different answers. The results show that the largest respondent sales market is Slovenia, followed by markets of former Yugoslav countries. The next large sales market is the market of EU countries, followed by the market of East Europe.

Table 4 - Respondents largest sales geographic region

Geographic region	Frequency	Percent (%)
Slovenia	36	97,3
Former Yugoslav countries	27	73,0
EU	25	67,6
East Europe	25	67,6
CEFTA	22	59,5
USA	12	32,4
Pacific - Asia	10	27,0
Australia and New Zeeland	9	24,3
Japan	8	21,6
Africa	8	21,6
Latin and Middle America	6	16,2

The presented research findings in the continuation relate to the above-stated sample of companies.

3.2. Analysis and Results

All the constructs, e.g. customer’s factors, customer’s goals, situational factors, communications factors and customers response were measured on the Likert scale. The respondents had to indicate their agreement with the statements on the 5-point Likert (1 strongly disagree, 5 strongly agree) scales. Despite the fact that the Likert-type measure does not claim to be more than an ordinal scale, it has, nevertheless, been accepted as a means of achieving interval measurement quality, and there are several arguments favouring a variety of positions on this issue [1].

The question we would like to answer is: “Are these items consistent in defining the scale?” The reliability of construct was assessed by Cronbach alpha reliability coefficient. The measures of assessed factors are reported in the following table.

Table 5 - Reliability test for selected factors

Factors	Number of items	Cronbach alpha
Customers factors	8	0,7555
Customers goals	7	0,7620
Communication factors	8	0,8011
Situational factors	6	0,8386
Customers response	9	0,7886

One of the objectives of the paper is concerned about the correlation between different marketing communications factors and customer's response exists. Accordingly, we make the hypothesis as follows:

Null hypothesis H_0: There is no correlation between marketing communications factors and customer's response.
Alternative hypothesis H_1: There is a correlation between marketing communications factors and customer's response.

Table 6 - Correlation matrix between marketing communications factors and customer's response

Correlation		Customer's response
Customers factors	Pearson Correlation	0,354(*)
	Sig. (2-tailed)	0,029
Customers goals	Pearson Correlation	0,598(**)
	Sig. (2-tailed)	0,000
Communication factors	Pearson Correlation	0,710(**)
	Sig. (2-tailed)	0,000
Situational factors	Pearson Correlation	0,516(*)
	Sig. (2-tailed)	0,001
Customer' response	Pearson Correlation	1,000
	Sig. (2-tailed)	-
** Correlation is significant at the 0.01 level (2-tailed).		
* Correlation is significant at the 0.05 level (2-tailed).		

The correlation coefficients between 0,300 and 0,700 are considerate that there's a moderate correlation between different marketing communications factors and customer's response. The test statistic exceeds the critical value so we reject the null hypothesis and

conclude that there is a significant correlation between all tested marketing communications factors and customer's response.
Because the pairwise correlation is found to be significant the relationship between the variables will be investigated by producing a linear regression model in the form of a linear equation. The four independent variables (customer's factors, customer's goals, communication factors and situational factors) have been constructed on the basis of questionnaire items, detecting the distinct potential effect on the customer's response. It is important to note that all the variables have been measured on a five-point Likert scale. For each independent variable, the average value and the standard deviation have been calculated.

Table 7 - Marketing communications factors

Communications factors	**Mean**	**St. deviation**
Customer's factors	4,07	0,41
Customer's goals	3,79	0,51
Communication factors	3,32	0,61
Situational factors	3,50	0,74

We would like to test if the regression model with four predictors (e.g. customer's factors, customer's goals, communication factors and situational factors) is significantly related to the criterion variable Y (e.g. customer's response)? Non-significant predictor variables were deleted from the initial regression model and the model re-run to give a parsimonious result. We test the equivalent null hypothesis that there is no relationship in the sample between the dependent variable and independent variables, but we found significance level only at one specific factor i.e. communication factor. Accordingly to this, the null hypotheses, which we tried to reject by means of regression analysis, could be formulated as follows:

Null hypothesis H_0: There is no relationship between the dependent and independent variables, i.e. The correlation coefficient between the dependent and independent variables equals 0 (H_0: $R_{xy} = 0$).

Alternative hypothesis H_2: There is a positive relationship between the dependent and independent variables, i.e. The correlation coefficient between the dependent and independent variables is significantly higher than 0 (H_2: $R_{xy} > 0$).

For the tested relationship, we selected the regression model with the highest significance, i.e. the model with the significance closest to the significance level of 5%. To investigate the hypothesis, entering all variables in a single block, we found that the proposed model explains a significant percentage of variance in the customer's response. Table 8 shows that 49 per cent of the observed variability in customer's response is explained by the one independent variable i.e. communication factors (R2=0,503; adjusted R2=0,490).

Table 8 - Relationship between communication factor's and customer's response

Independent variable (x)	**Dependent variable (y)**	**R^2**	**Adjusted R^2**	**Model**	**(Sign.) α**
Communication factors	**Customer's response**	0,503	0,490	Lin: $y = 0,705 + 0,662x$	0,000

Although the empirical results do not provide a high level of support to the conclusion, we believe that the positive relationship between the communication factors and customer's response can be still accepted on the basis of the available data. Such a result is in accordance to the findings of other authors [14].

Because only one of the independent variables (i.e. communications factor) shows the significant correlation with customer's response, the average value and the standard deviation for each variable of the communication sub factor have been calculated.

Table 9 - Mean and standard deviation of a set of communication factors

Variables of communication factors construct	Mean	St.dev.
Communication messages content a lot of information	3,45	0,76
We inform customers about the characteristics of our products	3,74	0,89
Communication messages emphasize characteristics such as reliability, service and trust	3,26	0,98
Communication messages contents practical suggestion of the use of our products	3,39	0,45
We prefer non personal forms of communication options	2,13	0,88
We prefer personal forms of communication options	3,82	0,98
We prefer interactive communication options	3,11	0,89
We study communication messages of our competitors	3,66	0,91

Results from Table 10 indicate that we can reject the null hypotheses that the coefficients for communication factors (Beta = 0,710, t = 6,024, p =0,000) are 0. The beta weight (Beta = 0,710) shows that the communication factors have a significant influence on customer's response.

Table 10 - Results of regression coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model	**B**	**Std. Error**	**Beta**		
(Constant)	0,705	0,370		1,908	0,064
Communication factors	0,662	0,110	0,710	6,042	0,000 [a]
[a] Dependent variable: Customer's response					

3.3. Implications

The findings discussed above have some managerial implications. The critical success marketing communications put forward in this paper serve as building blocks for the increased customer's response. It provides useful guidelines in the form of the critical marketing communications factors that can affect customer's response. It was demonstrated how specific marketing communications factors are related to customer's response. The critical factors proposed in the study also enhance the current practice of company's marketing communications.

4. CONCLUSION

To develop an optimal marketing communication program, a means to characterize, evaluate, and choose among different communication options is necessary. Towards these goals, we have introduced four sets of factors (with corresponding sub factors) by which marketing communications can be characterized: 1) customer's factors (e.g. knowledge), 2) customer's goals (e.g. processing goals); 3) communication factors (e.g., brand-related information); and 4) situation factors (e.g. place and time). These factors are characterized by interactions between them and customer's response.

Top managers assessed that these four factors can affect customer's response. The study confirms that there is an association between all four constructs (customer's factors, customer's goals, communication factors, situational factors) and customer's responses. We found the highest correlation between the communication construct and customer's response.

A statistical test did not support the hypothesis that a positive relationship exists between all four constructs and customer's response. But with statistical test we confirm a positive relationship between one specific marketing communications factor or construct (i.e. communication factor) and customer's response and from the results we can confirm that a set of communication factors influences customer's response. This paper attempted to provide some interesting perspectives as to how to view marketing communications and how different factors can are associated with customer's response. Managers can develop such marketing communication programs that can be competitive in today's environment.

A paper provides a perspective of how to analyze the factors affecting customer's response. The guidelines that emerge from this approach should be particularly relevant for marketing managers in industry. The paper closes with the implications of the findings and highlights promising future research avenues.

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UDK: 339.564(497.11) ; 338:339.137.2(497.11)ID: 196826892 **Review Article**

MANAGING COMPETITIVENESS OF SERBIAN EXPORT IN CRISIS BUSINESS CONDITIONS

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Abstract: *Chronic economic crisis, the legacy of the 1990s, is still present in Serbia. The global economic crisis has only sharpened existing problems and indicated that increase of competitiveness is one of the greatest challenges of the Serbian economy. The aim of this paper is to indicate the foreign trade and the competitive position of Serbia in the international framework as well as measures and methods that can improve export and competitiveness in crisis conditions.*

Keywords: *competitiveness, export, economic development, crisis business conditions, Serbia*

1. INTRODUCTION

Serbian economy has suffered enormous economic losses in the late 20th century, caused by the economic and political system, but also by the international sanctions. For almost a decade, Serbia has been excluded from international economic flows, which resulted in a loss of competitiveness in the long term.

The real process of economic transition towards an open market economy began and has been intensifying since 2000. The reforms were initiated, whose main goal was to create a modern and competitive market economy and integration into the global economic flows. Economy that was isolated and protected for years faced a more efficient competition, resulting in serious consequences for the most important development indicators. Today, Serbian economy faces a decline in GDP, threatening inflation, rising unemployment, high and rising foreign debt, high public spending and the deficit of the state budget, low competitiveness, modest export and enormous foreign trade deficit. During the period from 2000 to 2012, the current account deficit significantly increased due to the trade deficit. In addition to the model of economic development that had the greatest impact on this, obsolete technology in domestic companies resulted in low quality of domestic production and exports, and high import. Given that domestic but also the global economic crisis last, Serbia must turn to improving competitiveness, that only in mid and long term can provide multiple increase in exports, reduce unemployment and increase the real standard of living.

In searching for the answers on how to improve the competitiveness and export of Serbia in crisis conditions, we will first analyze the key features of foreign trade of Serbia in the transitional conditions. In the second part, we will evaluate the competitiveness of the Serbia's economy. The third part is dedicated to the measures and activities to be applied in the following period in order to improve competitiveness.

2. FOREIGN TRADE OF SERBIA DURING THE TRANSITION PERIOD

One of the main features of macroeconomic trends in Serbia after 2000 is high foreign trade deficit, that is, balance of payments deficit. In 2008, record high deficit was registered, threatening to undermine macroeconomic stability and trigger balance-of-payments or currency crisis. High external imbalances are associated phenomena in transition and are present in almost all of the countries in transition, mainly as a result of structural changes, significant capital inflows and convergence towards the developed countries of the European Union. Countries which have relatively successfully completed the transition process and which have managed to reinforce the economy and increase exports within a reasonable period (Hungary, Poland, Slovenia, and Czech Republic) managed to restore balance in the mid-term. Through commodity exchange Serbia makes surplus only with Montenegro, Bosnia and Herzegovina and F.Y.R. Macedonia, while achieving the highest deficit with Russia.

Economy of Serbia, which is still in the process of transition, is not competitive enough, which results in an insufficient level of investment, low level of economic activity measured by the GDP per capita (although in the last few years, some relatively high growth rates have been recorded) and a low level of exports per capita. If we accept exports per capita as an indicator of competitiveness, we will notice that Serbia, despite the high rates of export growth, significantly lags behind the more advanced countries in transition, but also behind the countries in the region. Countries which have managed to strengthen the export sector and to provide a high export, went through the transition process faster and largely failed to reach the most developed countries of the EU.

The long-lasting isolation of domestic economy has affected the technological lag of the economy behind the global tendencies and the decline in competitiveness of domestic products on the world market. Foreign buyers have increasingly stringent requirements in terms of product quality, their performance, design, servicing more complex products, which lead to an increase in competition on the world market. This results in insufficient growth in domestic exports, despite a growing export dynamics in the period after 2000. Serbian export structure should be adjusted to those areas for which there is a high demand, that is, to those that have significant share in the import structure (EU and CEFTA). The following table will show the foreign trade of Serbia during the period of transition.

Table 1. Foreign trade in Serbia from 2002 to 2012, millions of euro

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Exports of goods	2.202	2.441	2.832	3.608	5.102	6.432	7.429	5.961	7.393	8.441	7.244
Exports of goods, growth rate in % in comparison to the previous year	14,5	10,9	16,0	27,4	41,4	26,1	15,5	-19,8	24,0	14,2	-14,1
Exports of goods to the EU	961	1.202	1.457	2.118	2.943	3.603	4.029	3.196	4.235	4.869	4.181
Imports of goods	5.957	6.586	8.623	8.439	10.462	13.951	16.478	11.504	12.622	14.250	12.115
Imports of goods, growth rate in % in comparison to	25,2	10,6	30,9	-2,1	24,0	33,3	18,1	-30,2	9,7	12,9	-15

the previous year											
Trade deficit	3.755	4.144	5.792	4.831	5.360	7.519	9.049	5.543	5.229	5.809	4.871

Source: Ministry of Finance of the Republic of Serbia, http://mfp.gov.rs/pages/article.php?id=7161

It can be concluded from the presented data that, in the reporting period, Serbia achieved a significant increase in exports through foreign trade of goods from 2.2 billion euros in 2002 to 7.2 billion in 2012 and also an increase in imports from about 6 billion euros in 2002 to 12.1 billion euros in 2012.

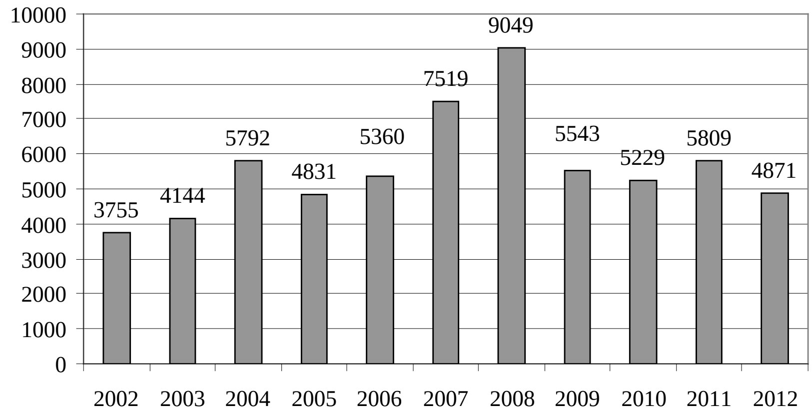

Chart 1. Serbian foreign trade deficit in the transition period

Source: Private graphic display based on Table 1.

According to the presented chart we can clearly see that the foreign trade deficit increased from 3.8 billion euro in 2002 to 4.8 billion in 2012. Also, based on the presented data (Table 1), we can see that the average growth rate of exports of goods and services in this period was 20.9%, while the average growth rate of imports of goods and services amounted up to 21.9%. After that, under the impact of the global crisis it came to a reduction in imports and exports as well as deficit of 2.6 billion euro. A slight recovery was noticed in 2010 due to faster growth of exports (24%) than imports (9.7%). In 2012 there was recorded a decrease in exports by 14.1% as well as imports by 15%.

The main reason for the increase in foreign trade deficit of Serbia is the gap between domestic demand and domestic supply. Domestic demand is greater than domestic supply, which is a core cause of high imports and consequently high foreign trade deficit. In addition, the foreign trade deficit is caused by insufficient economic savings compared to investments and by increased consumption of the population in relation to income.

In addition to low competitiveness, Serbian exports are characterized by unfavourable sectoral and geographical structure. According to the sectoral structure, dominant products are those of lower processing stage, mainly raw materials and semi-finished products. Intermediate goods make up more than 50% of total exports, and if we add the export of energy and other goods (mainly agricultural products) it can be concluded that the sectoral structures of Serbian exports are unfavourable.

The unfavourable export structure carries a risk to the achievement of export trends in the following period due to potential deterioration of the exchange ratio. The cause of unfavourable export structure is primarily poor sectoral structure of manufacturing industry which is dominated by sectors with lower added value (about 70% of manufacturing industry is made of intermediate products). Therefore, along with the changing structure of exports, it is necessary to raise the export potential of manufacturing industry and to increase the level of product finalization.

Based on the foregoing, we can conclude that the basic characteristics of exports of the Serbian economy are: [7]

- low level of production concentration, in spite of the relatively low value of total exports,
- in Serbia, resource-intensive exports is the most frequent, while other countries in Eastern Europe have the largest share of medium technology intensive products,
- export activities of several companies determine the overall dynamics of exports (US Steel, Valjaonica bakra i aluminijuma, Gorenje, Tigar…) due to low value of exports,
- production and export of food industry is largely influenced by meteorological conditions (product of farming).

There is also a significant correlation between exports and imports, thus the largest exporters are also the largest importers. Through these relations, it is difficult to reduce the foreign trade deficit, so one of the solutions is the import substitution through development of network of suppliers from the domestic market. It is necessary to take measures by which our economy would be recognizable in the world. This refers to production potential, export capacities and specifics of geographical origin of products etc.

Based on the analysis, we can conclude that Serbian export is not at a level that can provide sustainability of trends in the external sector, so it is necessary to take significant measures that could provide a more dynamic growth in exports. A key challenge in the following period will be to increase the level of product finalization and geographical diversification of export, that is, to increase competitiveness.

3. COMPETITIVENESS OF SERBIAN ECONOMY

It is a long history of falling competitiveness and exports of Serbia. During the 1980s, the competitiveness of Yugoslav exports during the period 1965-1988 was systematically decreasing. The same trend was present in Serbian exports. Due to growing social and economic crisis that occurred in the SFRY during those years, due to the disintegration of the country, the civil wars in the immediate environment, UN sanctions, many years of disinvestment, inadequate economic systems and economic policy measures, as well as the NATO air strikes in 1999, competitiveness of Serbian economy and exports was dramatically reduced in the nineties.

As the most important causes of the decline in exports can be mentioned: more intensive import bids after opening economy to the world, foreign trade liberalization, reducing tariffs due to insufficient domestic supply of goods and services, the appreciation of the local currency and the insufficient competitiveness of our economy on the domestic market, particularly on the international market, weak struggle of the state against monopoly and others. [2]

In the period from 2000 to 2006, the real effective exchange rate has been in the appreciation area, more precisely, the economy of Serbia was price uncompetitive in relation to the main foreign trade partners. This was particularly evident in 2000 and 2001 as a result of the exchange rate policy (exchange rate is used as a nominal anchor) and the process of liberalization and market opening (strong pressure on the growth of domestic prices, costs of living and manufacturer's prices). Therefore, due to faster growth of domestic compared to foreign prices, the result was a strong real appreciation of the dinar (RSD).

On the market, local currency could buy more foreign than domestic products, which confirms the deterioration of economic competitiveness. Simultaneously, the demand for domestic products reduces and import demand rises, resulting in an increase of the trade deficit, which then puts pressure on the national currency, with a loss of competitiveness.

Elements of cost competitiveness indicate improvement of competitive positions from year to year. During the period 2001-2009, the average annual growth rate of total labour productivity amounted up to 5.9% and was accompanied by an average annual rate of GDP growth (5.3%). At the same time, the average annual growth rate of unit labour costs over the period was 8.8%, but the rate was reduced by half during the period 2003-2005, amounting up to 4.4%.

Fisher index shows that the market share is determined by the expansion of export markets to a greater extent, and to a lesser extent by increasing export competitiveness. This is also a result of the absence of export specialization. From the standpoint of factor intensity since 2000, the structure of exports of the Serbian economy recorded an increase in share of low-technology and high-technology-intensive products, which is favourable from the viewpoint of improving competitive positions of the economy. Simultaneously, there is a high share of natural resources in the structure of exports, with about one-third of total exports.

Coefficients of specialization (concentration) of export and import in Serbia show a wide range of exports and imports structure. By 2002, coefficients of specialization (concentration) of exports were low, even lower than coefficients of specialization (concentration) of imports. After 2002, the range in the export structure narrows, which leads to an increase in coefficients of specialization (concentration) of exports. Relation between these two coefficients shows the level of specialization of total exports compared to the level of specialization of total imports. [4]

The essence of ranking competitiveness of the national economy and its performances in comparison to other countries is identifying the potential institutional market imperfections and weaknesses of economic policy, which could threaten the future economic growth. The World Bank monitors the competitiveness of world economies through the composite index of global competitiveness, which consists of three main factors: [2]

- Basic conditions,
- Factors of efficiency,
- Innovative factors.

According to the World Economic Forum Report 2012, Serbia is ranked 95th out of 144 countries ranked. Value of the Global Competitiveness Index (GCI) of Serbia is 3.87. The rank of Serbia compared to the previous year did not change, because in comparison to the previous year the value of GCI for Serbia has almost insignificantly declined by 0.01. Moreover, if one takes into account that the list of countries was expanded by two countries compared to the previous year, in spite of insignificant decline in the GCI value the same 95th rank of Serbia can be considered as stagnation at the achieved level of competitiveness, not regression.

The following two tables will show data on values and GCI rank of Serbia and the countries in its surroundings for the period from 2007 to 2012. Tables will include 11 countries: Albania, Bosnia and Herzegovina, Croatia, Greece, Hungary, F. Y. R. Macedonia, Montenegro, Romania, Serbia, Slovakia and Slovenia.

Table 2. The Global Competitiveness Index (2007-2012)

	Albania	**Bosnia and Herzego vina**	**Croati a**	**Greece**	**Hungary**	**F.Y.R. Macedonia**	**Montenegr o**	**Romania**	**Serbia**	**Slovakia**	**Slovenia**
2007 (131 countries)	3,48	3,55	4,20	4,08	4,35	3,73	3,91	3,97	3,78	4,45	4,48
2008 (134 countries)	3,55	3,56	4,22	4,11	4,22	3,87	4,11	4,10	3,90	4,40	4,50
2009 (133 countries)	3,72	3,53	4,03	4,04	4,22	3,95	4,16	4,11	3,77	4,31	4,55
2010 (139 countries)	3,94	3,70	4,04	3,99	4,33	4,02	4,36	4,16	3,84	4,25	4,42
2011 (142 countries)	4,06	3,83	4,08	3,92	4,36	4,05	4,27	4,08	3,88	4,19	4,30
2012 (144 countries)	3,91	3,93	4,04	3,86	4,30	4,04	4,14	4,07	3,87	4,14	4,34

Source: World Economic Forum, The Global Competitiveness Report 2007, 2008, 2009, 2010, 2011, 2012

According to the latest Report, the highest GCI value of 5.72 and the 1st place on the list in 2012 occupied Switzerland, while the lowest value of 2.78 achieved Burundi, ranked last, 144th place. It should be mentioned that the theoretical value of the GCI ranges from 1 to 7. Historically, the highest GCI value of 3.90 Serbia achieved before the first wave of the crisis in 2008, and already the following year 2009, value of GCI declined notably to 3.77. The decline in value of GCI is compatible with the fact that the competitiveness of the economy has declined due to financial crisis of global proportions. In relation to the countries shown Serbia is only better placed than Greece in 2012.

Table 3. Ranking of countries by the Global Competitiveness Index (2007-2012)

	Albania	**Bosnia and Herzego vina**	**Croati a**	**Greece**	**Hungary**	**F.Y.R. Macedonia**	**Montenegr o**	**Romania**	**Serbia**	**Slovakia**	**Slovenia**
2007 (131 countries)	109	106	57	65	47	94	82	74	91	41	39
2008 (134 countries)	108	107	61	67	62	89	65	68	85	46	42
2009 (133 countries)	96	109	72	71	58	84	62	64	93	47	37
2010 (139 countries)	88	102	77	83	52	79	49	67	96	60	45
2011 (142 countries)	78	100	76	90	48	79	60	77	95	69	57
2012 (144	89	88	81	96	60	80	72	78	95	71	56

countries)												

Source: World Economic Forum, The Global Competitiveness Report 2007, 2008, 2009, 2010, 2011, 2012

On the basis of the presented data it can be concluded that in 2012 only Greece recorded a slight underachievement in comparison to Serbia, thus ranked 96th. As a result of flaming political and financial crisis Greece has dropped 6 places in only one year, by 31 places compared to 2007. Another extreme example is Bosnia and Herzegovina, where it can be noticed that the competitiveness improved by 12 positions within the year, which ranked this country above Serbia, for the first time since the beginning of measuring and publishing the Global Competitiveness Index.

4. MEASURES AND ACTIONS TO BE TAKEN IN IMPROVING SERBIAN EXPORT COMPETITIVENESS

One of the main elements of the reforms in transitional countries, including Serbia, involves creating a new economic structure through the process of privatization, restructuring and modernization of the economy. To establish an adequate economic structure, the most significant are the structural changes in the industry. [3]

A low level of competitiveness in Serbia prevents obtaining foreign investments, increasing exports, and therefore the development of economy. In order to increase competitiveness, the Government of the Republic of Serbia established the National Competitiveness Council in 2003. Based on the previous results, it cannot be given a positive evaluation for the Council's efforts to improve competitiveness. [1]

Constant and fast increase in exports is a key task posed to the Serbian economy. Following the script, to realize anticipated economic growth rates, the growth rates of exports are expected to range between 19% in the baseline scenario and 21% in the basic version. Such high rates of export growth can be achieved only with significant changes of the export structure in terms of increasing the share of products with higher value added per employee, and with a significant increase in the export of services. How successful will be the Republic of Serbia in its future export efforts and in realizing the scenario of the given growth rates of exports depends on the overall success of the economy and the society as a whole to realize the envisaged reforms in order to complete the transition and increase economic competitiveness. Export growth will be a kind of resultant of all these measures and activities. Yet there are some measures and activities that are of particular concern to the increase of exports:

1. *Restructuring of the real sector*. Looking at the short term, the Republic of Serbia can intensify export of products in which it has a comparative advantage, and these are, above all, products of lower processing stages. Therefore, in the short term increase in export of these products may be the basis for the growth of total exports of Republic of Serbia, as well as to increase exports to the EU. In the medium term, however, any successful increase in export requires large investments and restructuring of the economy.

That is why further privatization and increased foreign capital inflows (with the transfer of modern technology) play a crucial role to increasing exports. Restructuring of the real sector will enable introducing new production programs, which will result in products of higher processing stages. The role of the state in improving export potential of the economy is mainly realized through institutional support. Specific measures and actions in this area are the following: [6]

- It is necessary to stimulate investment in new export fields of economy, especially identifying profitable export programs in the early stages of export.
- Government must play a significant role in identifying new markets by establishing specialized institutions to explore foreign markets and by publishing information on foreign markets.
- Role of the state may also be important to strengthen the reputation of domestic exports through creating and promoting the national export brand and establishing procedures for licensing that would guarantee high product quality. These export procedures are much more effective when not favouring only one, but a number of potential export industries qualified for this kind of support.
- On the world market today non-price competitiveness factors are particularly important, among which the place of honour belongs to the quality of product or service. A manager who wants to get on the international market must have a distinctive product in terms of technical and technological characteristics, which is ensured by ISO standards.

2. *Encouraging export to EU*. Having in mind that autonomous trade preferences of the EU significantly affect the exports of the Republic of Serbia to the EU, it is of great importance to take the effort to use the given preferentials more fully which has not been the case so far, primarily because of the structure and quality of domestic export products. Therefore, in harmonization of economic relations between Serbia and the EU, along with the macroeconomic elements, adjustments of economic components of our business systems to the EU standards should be made. The country must accept the standards of the European Union as soon as possible, especially those concerning the safety of use, health care and environmental protection. It must be ensured that the competent foreign certification bodies issue certificates for our companies on the introduction of ISO 9000 and others. It is also necessary to harmonize trade laws with the rules of European Union, which refer specifically to the field of customs procedures, competition law, company law, accounting, taxation and banking regulations. In the process of further harmonization of tariffs with the European Union, the level of tariffs should be examined for certain categories of products which are relevant for the state economy.

3. *Encouraging export to other regions*. With the fuller utilization of preferentials in trade with the European Union, the Republic of Serbia has to exploit as much as possible export opportunities on Russian Federation market and in a free trade zone in the Western Balkans.

4. *Development of SME and export clusters*. Creating a favourable regulatory, administrative and institutional framework for the development of SMEs, for their interconnection (in the form of clusters) and for connection with larger foreign and local companies, as subcontractors of certain tasks in the chain of production activities or suppliers of components, is another form of measures and activities of the state in stimulation of exports. [15]

5. *Completion of the transition process*. Successful completion of the transition process and restructuring of our economy will change the structure of export activities, so it is realistic to expect that in perspective, 50-60% of our exports will be made of some completely new products whose production will be based on foreign technologies brought by transnational companies present in our economy. Experience of the Eastern European countries that have gone through the process of transition can be of great benefit to its economy.

6. *Creating free zones*. Free industrial zones are underexploited potential for stimulating domestic exports. Free zones are physically fenced and marked parts of the territory of the Republic of Serbia, where manufacturing and service industries can be performed. [16] There are currently existing free zones in Serbia in Pirot, Subotica, Zrenjanin, Novi Sad, Kragujevac, Sabac, Uzice and Free Zone the South (only in Serbia which has 2 municipal government - in the City of Nis and Prokuplje), one is being prepared in Smederevo. In free zones, investors are provided special incentives and privileged tax regime (liberation from VAT and import duties on raw material and material used for production of export goods, machinery, equipment and building materials). The World Trade Organization promotes the zones as highly efficient and economically feasible. Implementation of the concept of free zones will affect: an increase in exports and foreign exchange inflow, creating new jobs, increase in foreign investment and the transfer of new technologies. The concept of free zones will contribute to implementation of the policy of regional development and progress of the individual, economically backward regions, establishment of cooperation between companies from the zone with the companies in less developed parts of the country.

7. *Increasing and Restructuring of exports*. In order to achieve economic growth rate, Serbia must constantly and rapidly increase exports. This requires increased competitiveness, primarily on the EU market where most of our foreign trade and flows of capital take place and to which we have the largest part of external debt, simultaneously requiring a significant structural changes in exports that was until now based on primary products and the products that are in the early stages of processing. Such a structure of exports does not hold a long-term and continuous growth rate in exports for Serbia.

8. *Elimination of remaining tariff and non-tariff restrictions* in the Free Trade Zone in Southeast Europe. Signing multilateral agreements should facilitate trade within the Zone, and the abolition of non-tariff measures will enhance sales opportunities as well as competition in the large market. Therefore, domestic enterprises must reckon with increased import competition in the domestic market. Current insufficient use of free trade agreements with the Russian Federation should be brought up to the next level and encourage FDI that would produce products to export to this market.

9. *Increased inflow of FDI*. Considering the conclusion that foreign direct investments are the most important means for recovery, for further development of Serbian economy and export growth, a new strategy of foreign capital inflow must become the backbone of its developmental and economic policy. National Economic Development Strategy of the Republic of Serbia, as a basic document of development priorities of the country and ways to achieve them, includes as the strategic decision, attracting foreign direct investment to enable the creation of new job opportunities, modern technology, efficient management and a new corporate culture. [5]

5. CONCLUSION

Primary determinant of the economy in global economic courses is certainly its competitiveness. All the economies that had understood that on time, have strengthened their economy in a relatively short period of time, and thus created an important assumption of sustainable economic development. Competitiveness is of strategic importance, especially for small countries which are directed to the international markets due to lack of necessary resources for development. A variety of studies indicate that Serbia has the potential to achieve much higher level of exports than the current level, but all the reasons for falling behind boil down to a common denominator: low competitiveness not only compared to the countries of the European Union, but also to the countries of the region.

There is an unequivocal conclusion that the level of competitiveness of Serbian economy is low and that it should and could be higher. The priority of economic policy in the forthcoming period, must be to increase the level of competitiveness. Increasing the level of competitiveness of economy and exports should be a primary task for Serbia, because only the competitive economy can resist the challenges and pressures of other market participants, and at the same time ensure the economic development and economic growth and social welfare. It is necessary to bear in mind that the condition of national business environment cannot be repaired overnight and it must be the result of long-term efforts toward the achieved goal. The problems that exist today were not created yesterday and they cannot be solved overnight. The best solution is to adopt a national strategy that would serve as guidance for all of the changes which are necessary to stimulate the competitiveness of a country.

In order to increase competitiveness of economy and exports, it is necessary to improve the investment climate in the country, with additional stimulation of FDI inflows to those sectors that can be the backbone of exports in the following years. In order to maintain the current pace of exports growth and strengthen the competitiveness of domestic companies in the global market, it is necessary to increase the financial potential of the Fund for crediting and export insurance. Furthermore, it is necessary to provide additional funds of the Serbian budget to promote local economy abroad as well as for stronger funding of research and development in local companies.

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UDK: 330.341.1:502/504 ; 502.131.1:33 ID: 196827660 **Review Article**

COORDINATION BETWEEN ECOLOGY AND ECONOMY FOR BETTER TOMORROW

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Abstract*: In the paper the effort was made to confront ecology and economy in order to attempt and have a better tomorrow. All that is happening in the environment is in correlation with the human being. Therefore, the contemporary economic theory is trying to solve the riddle about the cost of ecological optimization. The studies of ecological economy, spatial economy, resource economy, economic environment etc. are especially interesting. The model of ecological optimiyation is an ecological approach to conteporary technological development.*

Key words: *economy, ecology, environment, ecological optimization, economic theories.*

1. ENVIRONMENT

Every living being on Earth is the carrier of at least one natural process of substance exchange or metabolism and process of transforming of one type of energy into another. In such a way nutrition chains are formed whose constituents could be divided into: producers, consumers and dissolvent organic substances. In spite of all that, of course, it is not the question of a small number of plants or animals but of their entire population or all species which take part in the chains of nutrition, which create the living community and cover the greatest part of land and sea on Earth and inhabit it.
Ecosystem, according to this, has two components.
First is biological component which covers all living participants and organic processes happening inside them; the other component is abiological one and takes into account all organic and inorganic materials and substances and processes which exist outside living organisms as well as phenomena such as temperature, light and pressure.
Energy represents the most needed precondition for the existence of ecosystem. Two basic groups of natural ecosystems are differentiated:
a) Natural ecosystems with small or low energy usage (underground lakes, ocean depths, forests on great heights, polar areas).
b) Natural ecosystems with high energy usage (consumption) such as savannas, tropical forests or some others which cover or contain the greatest number of existing plants and animals (flora and fauna) species and which could transfer the part of organic substances, they produced by their own, into the ecosystems with low energy usage. Creation of the first primeval ecosystems on Earth has not been clarified yet but the principles and limitations of their development could be understood by the analysis of already existing ones.

1.1. Quality of environment

First of all, the quality of environment is determined by social relations, degree of production forces development (from the aspect of interaction of man and environment), aims which society realizes. The degree of responsibility for environmental quality is as much differentiated as the world is divided on social, economic, political and cultural sense of meaning.

The relation of scientific and technological development and quality of environment has to be based on the following:
General interest should dominate personal or single interest.
Environment and its treasure should be managed in such a way to ensure or provide long-term rational usage and reproduction-so called theory of sustainable development.
Maximal inclusion of all items and instances in decision making about development and part of responsibility.
Human needs, social targets and capacity of environment should be mutually coordinated.
Decrease of differences in development.
Questions which need to be answered in the process of overcoming of conflicts of scientific and technological development and quality of environment refer to the following:
Influence of growth and distribution of population on environment, specially the mutual influence of population, resources, capacity of environment and development.
Influence of present economic development on environment if present devastational trends continue (implication of wrong managing and less of natural resources in the process of determined development).
How to decrease differences in development, how to provide healthy food and enough clean water for all, how to decrease all types of environmental pollution and how to promote and improve natural resources management, especially forest and similar.

2. HUMAN BEING

Beside natural production and decomposition of different materials or substances in one ecosystem production of substances also happens and it is initiated by human beings. Anthropogenous production processes could be determined as the changes of place, shape or content of natural materials (raw materials) which a man moves, maintains and controls with the aim of production of the things for broader usage, or turnover value. Human beings or better to say a man has started many such processes. It is usual that economics only deals with movers or carriers of anthropogenous production processes and biology or ecology deals with the carriers of natural production processes.
Anthropogenous production processes could be divided into, at least, five groups such as:
a) Gathering dispersing (spraying), clearing (purification) and mixing of natural, mainly, inorganic substances. Such productive processes mostly happen in the field of mining, oil production and construction materials production.
b) Urging, slowing down or increasing of the volume of different various natural production processes. Such kind of production we meet, of course, in agriculture forestry and in molecular and atomic changes which in nature do not happen and whose final products could be made by natural causes (such processes and started and maintained in the greatest part of chemical industry and partially in black and non-ferrous metallurgy).
c) Gathering of semi products into ready made products, after that only waste remains (such processes are initiated in all industrial branches of higher production and processing phases).
d) Transfer or transportation of human beings, things and information, different services moved in order to make easier and better production or to make consumption easier and more comfortable (so called productive services).

3. DISHARMONY AND POLLUTION

Natural production processes are slowly changing in numbers and volume, in sense of evolution, and anthropogenous production processes which increased very fast in number and volume during the last two hundred years, have a lot of common elements. The most important is the special process because special processes happen, together with those two, in one limited space on Earth, but immediately the material one follows, because both of them use elements and joints which global fund changes structurally because of that, but it does not increase and does not decrease either. Elements and energy are common.

History of anthropogenous production processes shows that their movers or starters are never predefined or caused by preserving of ecosystem. For centuries nobody was endangered by this specially, because volume of anthropogenous processes was neglected. But from the industrial revolution onwards, such volume increased by great speed, so mutual and comparative happening of anthropogenous and natural production processes today cannot be found anywhere. Waste or damage which ecosystems suffered became visible only when anthropogenous processes reached great measure. Such measures and scales increased further on so anthropogenous processes began to disturb each other and they all together disturbed ecosystems to such extent that in some industrialized and urbanized parts of the Earth and space today basic human physiological processes are endangered.

Numerous clashes and disturbances created in such a way could be divided into two basic groups. First group consists of clashes and conflicts of anthropogenous productive processes and ecosystems. By killing or deforestation clearing away, some species could be destroyed indirectly and could be also terminated directly by chasing away, clearing away or destroying of their natural environment. This process is usually called degradation of human environment.

Second group of conflicts consists of overlapping of anthropogenous, productive, non-productive and consumption processes. Such overlapping happens at places where human productive, infrastructural and consumptive businesses meet.

Health, and most often life itself, are endangered today also by activities such as taking breakfast, lunch or breathing.

4. ECONOMICS THEORY

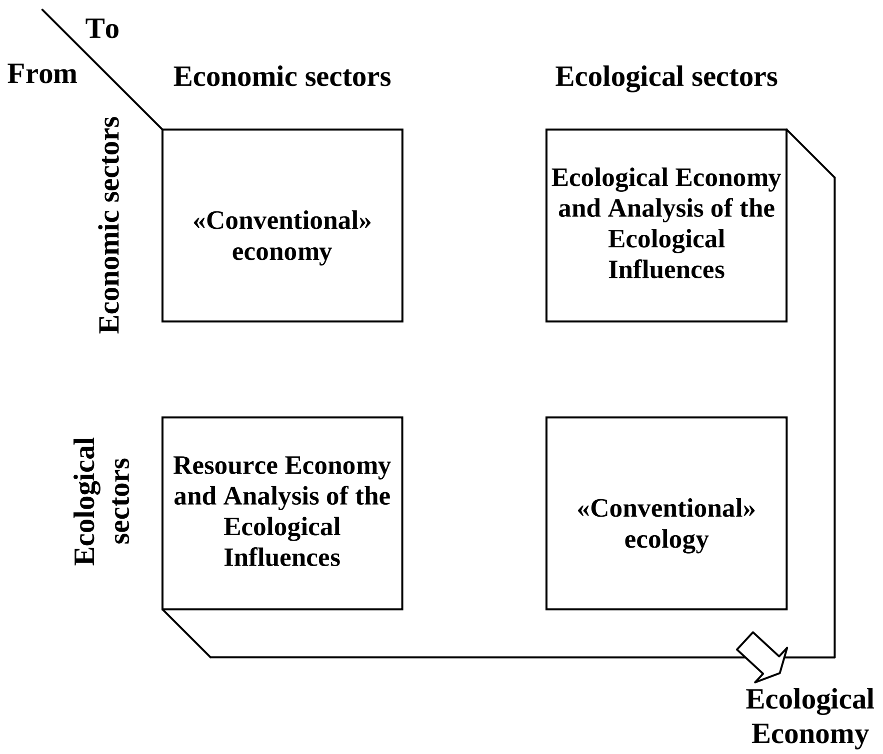
Economic type of disharmony of anthropogenous and natural processes is not hard to notice and realize. Polluters are always producers or consumers which, being restricted and limited by economic balance, mutually and at the same time produce, consume and earn. It is somewhat harder to see that economic type of disharmony by multiplication and spreading of pollution becomes more and more important. To the question whether the disharmony is solvable, the answers are positive from all aspects except from the economic one. Modern technology redefined most of pollution products and consumption processes and found their alternatives; medicine, biology, hydrology, meteorology and other important sciences are developed enough to give to such redefinitions the needed ecological categories and parameters. To the question why the global scale pollution still happens and how to stop it finally, it is obvious that it could not be answered before investigating economic motives and economic relations of starters or initiators of anthropogenous processes.

Anthropogenous production processes are started because of direct or indirect gains such as income in sale of produced, satisfying of different needs or fulfillment of some public interest and cause. In such a manner, nobody produces in order to make somebody delighted or anybody has such intentions during consumption.

So the most unavoidable question is: how does economics relate to the destruction of natural basis due to the economic process caused by their carriers?

This is a very complicated and compound question because it relates also to the theory and practice and it is good to place it on microeconomic and microeconomic level. Theoretic thinkers must ask themselves could the new phenomenon cover theories which are formulated in the time when waste and garbage were too small in amount to endanger anybody, or is it needed to formulate new ecological-economic theory; methodologists must decide if they will still offer existing development methods or they will think up the new ones and so on.

The question of economic policy is also unavoidable. Its carriers and supporters must realize and study existing instruments, think about new ones and determine and state what has to be done tomorrow in order to submit productive and consumptive motives and relations to self - understandable request for human environment in which humans can breathe, eat and drink freely.



Picture 1. Different areas of economy and ecology

4.1 General economic theory

Whatever the name (earth, space, ecosystem, resources, environment) and whatever the importance, natural basis if economic process is the subject of economic theory from its start up to now are the starting points counted from the first written documents in which economic process is partly analyzed, but not only described and it first of all belong to Richard Cantillon and his “General discussion about the very nature of trade” from 1755.

The list of all those who have tried to realize the relation of ecology and economy is very long, although some of them are worth mentioning such as: Keyns, Schumpeter, Adam Smit, Riccardo, Maltuss, Marx, Marshal, Larette.

4.2. Spatial economy

Spatial aspects of economic process are such that it stays out of all trends from the very beginning of economic theory because of analytical difficulties.
But, spatial aspect of economic process is obvious and interesting, so, almost separately from development of general economic theory, some economists deal with it.
Some tried to get to the answer where the homo-economicus places his production plant so that he can transport all he needs and drives away what he sells with the least price and expenses.

Between the two Great Wars (First and Second World Wars) the distribution and allocation of production units began, including their dislocation, so this movement created and gave birth to excellently elaborate spatial-economic models, and also a new discipline called regional economy grew out of this. But, space entered into economic theory in such a way, stays two dimensional and static (Weber and Tinnen).

4.3 Theory of growth

Lack of the category of time in neoclassical economics theory was, for the same time, complemented by so called comparative static analysis. Only in the period between the two Great Wars theoreticians began to deal with the time as the continual variable, which resulted in the line of models and even theories of growth. Almost all scientists who dealt with this topic were satisfied by the starting point that growth meant to produce more than it was produced in the previous period, so that models had to solve the relations of saving, investment, used capital and work and final product and place them in such a way that all capital invested became used or spent and turned into product and sold. In such a way the theory of growth, up to now, did not come closer to the solution of ecologic aspect of economic process.

4.4. Economics of resources

The problem of exhaustion of resources arrived also at the cabinets and study rooms of neoclassical theoreticians as late as before the Second World War. The first written papers and items of this kind appeared in the 1930's but the economics of natural resources grew into the economic discipline only after the Great War. Economists are mainly interested in the facts such as: how fast is it needed to spend one exhaustible resource in order to maximize gain and realize dynamic balance. In such a way the economics of resources deals implicitly with them in fact by chance.

4.5 Economics of environment

Economics of environment (environmental economics) which, as a separate discipline, developed very fast during the last twenty years, became thoroughly comparable to economic resources and with the economic resources but it did not comply with results or with the approach. The basic question or issue with which this discipline deals is the social expense of endangerment of human environment, but, since the analytical apparatus is also here neoclassical the existing theory was first called to help.

Air, water, sea and all other things which belong to nobody and everybody, are taken as the concept of public wealth, public goods, but on the contrary, the concept of pollution was taken as external. Environmental economists in such a way look upon time preferences, social rate of profitability and reliability; find models which force the polluter to calculate external gain into their global calculation of balance; they also reexamine and re-estimate the concept by which Cost-benefit analysis tried to be based as the theory. Such an approach, inevitably, leads to the require-environment, so this request is placed in the first items of this new discipline.

Beside various additional presumptions, economists of environmental theory came to the mathematically valid models but not to the usable methodological procedure and steps of procedure. The reason for that is not hard to notice: the question is of something which appears on market and whose consumption could not be exclusively determined and paid for.

4.6 Ecological economy

During the last ten years there was the increase in the number of works and papers concerning economics of environment which were not based on neoclassical microeconomic apparatus. They are characterized by interdisciplinary approach, return to general theory, repeated and repaired interest for the classics, critics of existing models of growth and attempt of founding the new ones in order to have presumptions about resources and space in which economic processes happen. Space is here determined as a dynamic multidimensional category, so, as the category which, of course, changes by the work or impact of economic subjects. It is the discipline, as many other things concerning the environmental protection and safety, a brand new discipline and promises a lot. The name of this discipline is given recently and it is quite a suitable one.

4.6.1. Problems of “ecologization”

Problems of introducing ecology into technology

However, from the previous scientific-technical development and quality of environment it could be concluded that.

1. Scientific-technological progress in basic technological process did not have significantly important influence on emission of waste materials in processing industry. Improvements and changes had their influence on the usage of energy and raw materials and on improvement of working conditions. There is the significant number of exceptions and the most known and important is the technology of chlor production, in which, from ecological reasons, electrolytical procedure with mercury cell is exchanged with the process of membrane cell.

2. Scientific-technological progress was, in its largest part, directed toward solving of waste material drainage out of basic technological processes, meaning that waste materials are the products of basic technological process. All these actions are targeted toward:
Transformation of waste into non-detrimental materials, which, without influence on environment and living surrounding can be thrown into human environment (for example the waste water purification).
Returning of waste materials back to production processes (recycling).
Solution of usage of waste materials in other production processes (revalorization).

Useful usage of waste materials outside production processes (for example usage of slag or dross from melting furnaces in road construction).

3. Treating of waste material outflow is based, in its basic notion, on usage of mechanical chemical and biotechnological procedures. Basic knowledge for these procedures is developed but solutions must be created for each separate case having in mind the matter of specific material systems and specific conditions in which each problem must be solved.
Beside industry and mining, important factors of environmental pollution are also agriculture and traffic.
It is not needed to emphasize specially the need of solving of some determined conflict situations preconditioned and caused by development of science and technology in relation to quality of environment. Traditional, short-term aims of development of science and technology must be in correlation with long-term effects on quality of living surrounding. If such interdependence is not done optimally, there is the risk that the problems of environment can be transferred on to economic stability, national safety and political manipulations. But, some problems of environment are already seen on the global level:
Change of climate, caused by greater concentration of carbon monoxide could have great economic and social effects and consequences.
Enormous and over limited air pollution by acid rains already endangers almost all continents.
Effects and consequences of inadequate usage of chemical substances and inadequate managing of dangerous waste materials come out of the scope of national competence.

4.6.2. Ecological approach to technological development

Ecological overload in the developed countries mainly does not allow import and processing of raw materials on their territory but, on the contrary, requests import more and more purified materials or substances (for example metals, cellulose and polymerized substances), by which some pollution technological processes of processing of mineral raw materials are avoided. Developed countries try to reject old fashioned technologies which, because of more and more strict requirements for environmental safety and protection, became less profitable and less economical and on the first glance in absolute index measuring, it seems as the economy development of one country is increased and accelerated. But, the final result is such that the developing counties accepting the pollution technologies enable and help the developed countries become increasingly wealthy just because of this fact.

Developing countries cannot keep pace with the developed ones and the gap between them increases. They, in fact, under the seemingly good conditions of technology transfer, often transfer the problems of environment onto its own territory. Such phenomena already have their names: neocolonialism or Eco colonialism. Special part of Eco colonialism is the pollution of international rivers, seas and oceans and also we cannot underestimate the phenomena of polluted air transmission onto very large distances, up to industrially not developed countries.

Today, it can be said that ecology, from the starting branch of biology, became a great issue of interest of knowledge and facts in the center of which a human being found itself and with it the whole organization procedure of creating the life on earth. Ecology has stopped to be studied by biologists and now the scientist of different professions and vocations deal with it.

4.6.3. Ecological markers

In the relation of a man or a human being toward nature there are two ways of endangerment and decreasing of its values:

Direct attitude or behavior by which natural resources are directly devastated and used and by which the centuries old ecosystem is disturbed or made disappear or plants and animals became increasingly less numerous.

Indirect attitude in the case of which, on the basis of natural resources processing and processing of other substances the environment became contaminated or polluted and it is the case mainly with soil, water and air.

Ecological engineering, tries, by the use of scientific methods and new additional technological processes, to solve the problems and contradiction of environment and rational usage of natural resources energy and raw materials. Branch or area of interest of ecological engineering is a very vast one characterized by interdisciplinary and multi-disciplinary approach because it covers the entire phenomenon of living in one environment and it must be understood from the basis and aspect of science, technology, economy and social policy.

Area of interest called ecological engineering which covers equipment and procedures for prevention of environmental pollution is marked with the notion eco-technics. Technological solutions of ecological engineering could be found, first of all, in the usage of such technologies which do not pollute the environment (pure, clear or eco-gene technology).

Non-pollution or pure technology, as already accepted subject, means practical usage of scientific discoveries, methods and technical means elaborated to ensure and provide most rational usage of all natural resources as well as the ability to solve the problems of general process of human society but, at the same time, to protect environment (living and working environment).

Although there are, in all countries, the parties which oppose the notion of technology without waste materials, because they think that it endangers or even destroys national economies, the greatest number of scientists came to the conclusion that economic processes could be only those which return to nature all things initially taken from there in the process of production.

Basic elements of non-pollution technology are:

Practical usage of modern methods of exploitation and concentration of mineral raw materials.

Improvement and development of new technological processes in which, to the greatest extent, outlet, drainage or release of polluters into the atmosphere is solved in the best way.

Development and usage of efficient technological procedures of waste water and waste gases purification.

Usage of all kinds of waste materials in the area of some determined or the area of usage of some other industry.

Introduction of non-pollution technology covers:

Gathering information concerning creation of waste materials, their separation and possibilities of their usage for other purpose.

Storage and analytical control of waste materials.

Special scientific and expert activity in this domain.

Coordination and coupling of social activities with the special accent to laws and regulations.

In the moment when the choice of some determined technology is in question it is possible to choose between two solutions.
1. Add some parts of technological processes to the already introduced technological processes by which waste materials detrimental for environment are eliminated.
2. Introduce pure technology such as to have minimal negative impact to environment.
The method of cost-benefit determination still gives the best results concerning investment decision making or choosing of solutions, because it is based on the comparison of more or less different measuring influences and consequences on the environment.

	"Conventional" Economy	"Conventional" Ecology	Ecological Economy
Basic view on the World	Mechanistic, Static, Atomistic	Evolutionary, Atomistic	Dynamic, Systematic, Evolutionary
Time	Short	Wide	Wide
Space	Local to International	Local to Regional	Whole Ecosystem, including Human
Species	Only Human	Everything except Human	Whole Ecosystem including Human
Primary Macro Goals	National Economy Growth	Survival of the Species	Ecologic and Economic System Sustaining
Primary Micro Goals	Maximum (firm) Profit Maximum Usage (Singles)	Maximum Reproductive Success	Has to be adjusted to sustain system goals
Assumptions about Technical Progress	Very Optimistic	Pessimistic or without opinion	Wisely Skeptic
Academic attitude	Disciplined	Disciplined	Trans-disciplined

Table 1. Comparison of "conventional" economy and ecology with ecological economy

4.7. Development methodology

At the beginning of 1970's existing and potential pollution of environment started to be approved and accepted by social and economic development of methodology. Attention is not only paid to achievements of development projects, to those who take them and realize them and to the economy who changes more or less because of them, but attention is also paid to the effects and achievement toward environment.

Development methodology almost exclusively develops from civil side as dichotomy of economic science. Existing methods which look upon social approach and taking also try to conform toward ecological criteria and requirements, but because of many reasons, in practice there are shown many shortages and defects. Beside them there are new methods developed which are generally new and planed and aimed exclusively for evaluation of proposals of production, distribution, consumption and usage which threaten the pollution of environment.

Methods which today are at the disposal to us are numerous and could be classified into three groups of methods. The question is of cash-flow analysis, cost-benefit analysis and about the group of procedures most often called Environmental Impact Assessment (EIA).

4.8 Economic policy

Care taken about polluters and attention paid by project founders, investors and others is of different kind. Most often, however, it is taken care how to avoid attention and concern so in most cases the responsible polluters which are responsible for endangerment and real damage of their environment still try to behave as the air and water are free raw materials for twenty last years, laws and standards are issued which explicitly determine and often sharply impose sanctions for ecological damage and determine the degree of ecological damage caused by production, distribution and consumption and also propose what other things the investor or potential polluter must do to avoid or prevent pollution of environment.

Direct force and enforcement of law is more often supplemented by different methods of economic special fiscal policy. Also funds are raised for financing cleaning of polluted localities and water flows, waste material and poisons dislocation as well as for scientific research from which directly usable and applicable results are expected.
Environmental safety care, in such a way, has not been only incorporated in institutionalized enforcement of law and regulations but is also founded on direct interest of all participants who do their business activities and activities of economy.

5. ECOLOGICAL OPTIMIZATION

Ecological optimization of the existing production processes and production plants can give successful results if it is based on broadly organized and planned scientific, research and consultant work which should cover economy, science, consultant and engineering enterprises and companies. Activities organized in such a way should issue the following results:

Optimization of basic technological processes in the aim of improvement of their selectivity and efficiency, better usage of raw material and energy, decrease of pollution creation and emission and waste material creation, also improvement of better working conditions.

Development of technological processes in the aim of fulfillment of conditions for recycling of waste water flows and their repeated usage in production processes.
Development of technological possibilities for usage of waste materials for other useful purposes.

Development of methods and equipment for efficient and permanent control of environmental state, especially in closer and further environment as well as potential sources of pollution.

Development of productive adequate processing equipment for purification of waste materials flows.

SUMMARY

The author tried to confront the economic and ecological principles of development. The relation of a man and the environment was investigated in the sense of it being in disharmony and resulting in pollution and resource destruction. It was normal that the subject rose interest in the economic theory how to join the ecologic optimum and economic maximum. The result was the ecologic economy which satisfied both of the principles, economic and ecological. The author states that the technology, that is the tendency for faster technological development, is the source of most os the ecological

problems. All in all, the paper communicates that the optimal ratio between the economic and ecological issues is vital.

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UDK : 004.738.12 ; 004.438"JAVA" ; 004.439"HTML" ID:196828428 **Review Article**

BUILD A MOBILE APP WITH HTML5 AND JAVASCRIPT

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Abstract: *You don't need separate platform-specific technologies to develop powerful, useful apps. And you'd be surprised with what you can build with HTML5 and popular JavaScript libraries. The app will be called "Where You parked your car", and we'll build it with jQuery Mobile and Cordova (also known as PhoneGap). To create this application, I'll also use the new HTML5 API, specifically the local storage and the geolocation (actually not really part of the HTML5 specs), as well as the Google Maps API. A hybrid app is built using web technologies, and then wrapped in a platform-specific shell that allows it to be installed just like a native app.*

Key words: *1. Web app.; 2.HTML 5; 3. Java Script, 4. Google Maps API, 5. JQuery Mobile*

1. INTRODUCTION

The aim of ”Where You parked your car” is to let you bookmark where you parked your car on a map using the GPS function of your smartphone, and then—after you have finished your walk—find a route to return to it. This kind of application is useful if you don't have a good memory or if you're in a foreign city. In addition, ”Where I parked my car” will also save a log of your saved positions (up to 50), so that you can retrieve a location for future use. Since scrolling a list of 50 items can be really annoying, the app will have a search filter so you can easily achieve the task. The list allows you to see the position on a map, and you can also to delete one or more old locations. Finally, I'll also create a small credits page within the app.

The Ingredients

To fully understand what's going to be developed, you must have at least a basic knowledge of the following languages and frameworks:

HTML: It will be used to create the markup of the pages. Where appropriate, I'll use some new HTML5 tags.

CSS: Since most of the CSS enhancements will be done by jQuery Mobile, it isn't really needed extensively. However, I'll use few rules to correct or adjust some styles as you'll see later.

JavaScript: The business logic is entirely written in JavaScript so if you don't know some key concepts like what's a callback or a closure, you'll need to study it before proceeding.

jQuery: I'll use jQuery mainly to select elements and attach event handlers, so there's nothing special here.

jQuery Mobile: It'll be used to automatically enhance the application interface. I'll use the page loading widget, the listview for the positions' log, and I'll put some buttons inside the header and the footer of the pages to to build a toolbar.

Cordova (PhoneGap): As said before, Cordova will be used to wrap the files so you can compile them as if you built a native app. Of course, I'll take advantage of some of the APIs offered by the framework, such as notifications, geolocation, and connection

The version of jQuery Mobile used will be 1.2.0, so if you need a refresher on what's new in this version, you can read What's New in jQuery Mobile 1.2.0? and Build Lists and Popups in Minutes Using jQuery Mobile. The Cordova version used will be the 2.0.0. I choose this rather than the newer versions, because in my tests it has performance better in conjunction with jQuery Mobile.

Apart from the above list, I'll use also these APIs:

Geolocation API: It provides location information for the device in the form of latitude and longitude. Since many operating systems already support it, Cordova will use the native interface rather than its own implementation. However, for the platforms that don't have this API, Cordova uses its implementation that adheres to the W3C specification. If you need an introduction to this API, you can read Using the HTML5 Geolocation API.

Google Maps API: The Google Maps API lets you integrate the Google Maps service with your website. The service is completely free, but you should subscribe to the APIs console website to obtain your own API key, and use it when you send a request to the service. Since this API will still work without the key, I'll use it without a unique API key.

Web Storage API: This provides access to the devices storage options. If you need a starting point, you can take a look at An Overview of the Web Storage API.

Remember that Cordova uses a different JavaScript file for every operating system, so if you'd like to compile the application on your own, you need to use a specific IDE-SDK bundle like Eclipse and the Android SDK, Visual Studio and the Windows Phone SDK, and so on, for every platform. This could be a real pain, so "Where I parked my car" will be developed with the assumption that the compilation will be done using the Adobe cloud service, called Adobe PhoneGap Build. It'll be the service itself that includes the correct Cordova library for each platform at compiling time. So, to follow this tutorial, you can use a simple text editor or the IDE that you prefer to use, for example NetBeans, without installing any other SDK. I'll release the final code on my bitbucket repository, and I'll include the Android JavaScript file.

The Project's Structure

The structure of the project will be quite straightforward. In fact, I'll create the HTML files, the Adobe PhoneGap Build configuration file, the standard splashscreen, and the app's icon in the root of the project. Then, I'll divide the other files into three categories (actually folders): CSS, images, and JS. To develop "Where I parked my car", in addition to the jQuery, jQuery Mobile, and Cordova files, I'll create the following documents:

index.html: This is the entry point and will include all the libraries' files used throughout the application. It'll also have the buttons to set and get the current position and to view the positions' log.
map.html: This is where you'll see the map that will show you your position, your car position, and the route to reach it.
positions.html: This page will show the positions' log as a list.
style.css: As I said before, I'll write few style changes that deviate from the jQuery Mobile standard style.
jquery.mobile.config.js: It'll contain a configuration for jQuery Mobile
functions.js: This file will contain the function to initialize the application and some other utility functions.
maps.js: This file will have the functions that use the Google Maps API to draw the map and the route to the car.
positions.js: This file will save and load the previous positions using the Local Storage API.
config.xml: This XML file will contain the metadata of the applications and will be used by the Adobe cloud service to store settings like the app version number and the package contents.
At this point, you might argue that since we're building a small app, I could use a single file that has all the pages combined. You're absolutely right, but I prefer to keep things separated for organization.
Setting Up the Project
First of all, create the project folder, for example "where-did-i-park" and create the three folders mentioned above: CSS, images, and JS. Now, you need to download the jQuery, jQuery Mobilem and Codova files. Place all the JavaScript files of these frameworks inside the "JS" folder, put the jQuery Mobile bundled images in the "images" folder, and finally put the jQuery Mobile CSS file inside the "CSS" folder. If you've done everything right, the project should have the following structure:

```
\---css
|  \---jquery.mobile-1.2.0.min.css
|  \---style.css
\---images
|  \---ajax-loader.gif
|  \---ajax-loader.png
|  \---icons-18-black.png
|  \---icons-18-white.png
|  \---icons-36-black.png
|  \---icons-36-white.png
\---js
|  \---cordova-2.0.0.js
|  \---jquery-1.8.3.min.js
|  \---jquery.mobile-1.2.0.min.js
```

As said before, a reference to the Google Maps API is required. Including the file that you need is very simple and consists of just adding the following line to your HTML.

```
<script src="http://maps.google.com/maps/api/js?sensor=true"></script>
```

Please note that this line contains a sensor parameter. It must be included in the URL and set to true if you're using a sensor (like a GPS), or false otherwise. Since we're using the Maps API to create a mobile app, we'll set it to true.

In this first and introductory article, I showed the features of "Where I parked my car" and outlined an overview of the technologies that will be used for its implementation. I have structured the files that comprise the application in an organized fashion so that we can move straight toward developing.

2. THE HOMEPAGE

In this part we'll show you the source of all the HTML pages that make up the application, highlighting the key points of each one. We'll also explain the short stylesheet that's included. Unless you build explicit custom configurations, jQuery Mobile will load all of the pages using AJAX so, all the files needed by "Where You parked your car", such as the CSS and the JavaScript files, have to be loaded by the entry point, that is index.html.

The index page will show the title in the header and the credits (actually my name) in the footer, with a button to see additional details about the author (again, me). As explained in the first part, the index has three buttons: one to see and save the current position, one to see your current position (and to view the route to the car), one to look at the previously saved positions. Having said that, the code of the homepage will result in the following source.

```
<!DOCTYPE html>
<html>
  <head>
     <meta charset="UTF-8" />
     <meta name="viewport" content="width=device-width,
initial-scale=1">
     <title>Where I Parked my Car</title>
     <link rel="stylesheet" href="css/jquery.mobile-
1.2.0.min.css" type="text/css" media="all" />
     <link rel="stylesheet" href="css/style.css"
type="text/css" media="all" />
     <script src="js/jquery-1.8.3.min.js"></script>
     <script src="js/jquery.mobile.config.js"></script>
     <script src="js/jquery.mobile-1.2.0.min.js"></script>
     <script src="js/cordova-2.0.0.js"></script>
     <script
src="http://maps.google.com/maps/api/js?sensor=true">
</script>
```

```
      <script src="js/functions.js"></script>
      <script src="js/maps.js"></script>
      <script src="js/positions.js"></script>
      <script>
         $(document).one('deviceready', initApplication);
      </script>
   </head>
   <body>
      <div id="welcome-page" data-role="page">
         <header data-role="header">
            <h1>Where I parked my car</h1>
         </header>
         <div id="content" data-role="content">
            <p>
               Where You parked your car lets you bookmark
where you parked your car on a map
               and then find a route when you want to return
to it. The app will also
               save a log of your saved positions (up to 50).
            </p>
            <a href="map.html?requestType=set" id="set-car-
position" data-role="button">Set position</a>
            <a href="map.html?requestType=get" id="find-car"
data-role="button">Find car</a>
            <a href="positions.html" id="positions-history"
data-role="button">Positions history</a>
         </div>
         <footer data-role="footer">

         </footer>
      </div>
   </body>
</html>
```

You might note that, for the header and the footer of the application, I've used the new HTML5 <header> and <footer> tags instead of the generic <div>. Moreover, all the buttons inside the <header> and the <footer> tags, use the attribute data-iconpos="notext" that tells to jQuery Mobile to hide the text of the link. This attribute is very useful for small screens. However, as you'll see later, I'll attach an handler to the pagebeforecreate and the orientationchange events, so programmatically I'll test for the size of the screen and, if a larger screen is found, the attribute will be removed and the text will be shown in full.

The Map Page

The map page (map.html) is probably the most important page of the application and, quite surprisingly, it's also the simplest one. In fact, apart from the header containing the app's title, it'll have a single empty <div> where the map will be shown. (The map will be generated on-the-fly by the Google Maps API so you won't have to worry about the markup.)

In conclusion, the full code of the map page is the following:

```
<!DOCTYPE html>
<html>
   <head>
      <meta charset="UTF-8" />
      <meta name="viewport" content="width=device-width,
initial-scale=1">
      <title>Where I parked my car</title>
   </head>
   <body>
      <div id="map-page" data-role="page">
         <header data-role="header">
            <a href="#" data-icon="back" data-rel="back"
data-iconpos="notext" title="Go back">Back</a>
            <h1>Where I parked my car</h1>
         </header>
         <div id="content" data-role="content">
            <div id="map">
            </div>
         </div>
      </div>
   </body>
</html>
```

In the <head> section of this page, I haven't put in the CSS and the JavaDcript files. I'll rely on the standard AJAX mechanism of jQuery Mobile, so there's no need to add them into the pages manually other than the entry point of “Where You parked your car”. As you may have noticed, in the <header> of the page, I put a “go back” button. There are two reasons for this, one less obvious than the other. The first and more straightforward is to enhance the usability. Regarding the second reason, remember that an app developed using jQuery Mobile and Cordova can be deployed on many operating systems. However, while the Cordova APIs work in almost the same way across all platforms, there are some substantial differences among physical devices. For example, the Android devices have a physical “go back” button, so if you want to go to the previous page, you can use that. Conversely, the iPhone does not have a physical “go back” button (other than the “home screen” button, which would exit the app entirely), so if you don't build one into your interface, your iPhone users will be highly penalized.

Position History

The position history page (positions.html) will show you the list of the previously-saved positions, giving you the ability to search for a specific location and even delete one or more items. The page has an empty list that will be filled programmatically, as you'll see later. The list has two key attributes to analyze that are data-filter="true" to notify jQuery Mobile that you want a search filter above the list and data-split-icon="delete" to set the icon on the right of the text shown in the list item (the address). The latter is used in the split button lists, a type of list where each item has two links that (should) execute different actions: a main action activated when the user clicks on the list item text (the first link text), and a secondary one activated through the button that replaces the secondary link text, positioned after the item text.

The complete source of positions.html is the following:

```
<!DOCTYPE html>
<html>
   <head>
      <meta charset="UTF-8" />
      <meta name="viewport" content="width=device-width,
initial-scale=1">
      <title>Positions' history</title>
   </head>
   <body>
      <div id="positions-page" data-role="page">
         <header data-role="header">
            <a href="#" data-icon="back" data-rel="back"
data-iconpos="notext" title="Go back">Back</a>
            <h1>Positions' history</h1>
         </header>
         <div id="content" data-role="content">
            <ul id="positions-list" data-role="listview"
data-inset="true" data-split-icon="delete" data-
filter="true">
            </ul>
         </div>
         <footer data-role="footer">
            <h3>Created by Aurelio De Rosa</h3>
            <a href="aurelio.html" data-icon="info" data-
iconpos="notext" class="ui-btn-right">Credits</a>
         </footer>
      </div>
   </body>
</html>
```

Style Tuning

jQuery Mobile does a very good job enhancing the pages' interface, nonetheless there's always room for some style tuning. By default, even if you don't have buttons within the header or the footer of a page, the framework still reserves some space on both side of the elements. So, if the text inside the header or the footer—usually a title as you've seen in the sources listed—exceeds this space, jQuery Mobile cuts the text and appends an ellipsis. However, this happens to other elements as well, and I don't always want it to happen. So, in the very short stylesheet that I mentioned in the previous part called style.css, I changed it by applying the rule white-space: normal !important;. Another relevant point to discuss involves the <div> having the id of map. As said before, it'll be filled programmatically by the Google Maps API, so at the beginning it doesn't have its own height (it's just an empty <div>). This means that if you don't set a height, you won't see the map, even if the Google Maps API is working. I set the height to 600px, but you can change it to fit your taste.

The source of the discussed stylesheet is listed below:

```
.ui-header .ui-title,
.ui-footer .ui-title,
.ui-btn-inner *
{
   white-space: normal !important;
}
.photo
{
   display: block;
   margin: 0px auto;
}
dl.informations dt
{
   font-weight: bold;
}
#map
{
   width: 100%;
   height: 600px;
}
```

In this part, We've shown all the HTML pages of "Where You parked your car", so now you're able to navigate across them. However, at the moment, the pages are missing the business logic that will govern the functionality and interaction. In the next part, We'll start explaining some of the JavaScript files that power the application and I'll be going into deep of the Cordova APIs.

3. JQUERY MOBILE CONFIGURATION

jQuery Mobile does a lot for you just by adding it to your project without any special settings. However, there will be times when you want to modify or to take control of some default behavior. You can achieve this writing a configuration file. As stated in the first part of the series, the app has a file called jquery.mobile.config.js that, as you might guess, contains a configuration for jQuery Mobile. The most observant of you might have noticed that in the index.html file, the configuration is loaded before the library. You have to do so because when jQuery Mobile starts, it fires an event called mobileinit, and this is also the event you have to bind to override the default settings. Hence, you have to attach the handler before jQuery Mobile starts, but after the jQuery library.

You can override the default configuration in two ways. The first is using the jQuery extend() method as you can see in the following example.

```
$(document).bind('mobileinit', function() {
  $.extend($.mobile , {
    property1: value1,
    property2: value2
    // and so on...
  });
});
```

The second way is to set the properties using the $.mobile object.

```
$(document).bind('mobileinit', function() {
  $.mobile.property1 = value1;
  $.mobile.property2 = value2;
  // and so on...
});
```

Explaining all the jQuery Mobile properties is outside the scope of this article, however you can study them in deep detail by reading the jQuery Mobile configuration docs.

In the app configuration file, I won’t change a lot of properties. I’ll focus on changing the pages’ transition, the option to show the text when showing the page loader widget, and the theme. The full source of the file (that uses the second method to set jQuery Mobile properties) is listed below.

```
$(document).on(
  'mobileinit',
```

```
    function()
    {

      // Default pages' transition effect
      $.mobile.defaultPageTransition = 'slide';
      // Page Loader Widget
      $.mobile.loader.prototype.options.textVisible = true;

      // Theme
      $.mobile.page.prototype.options.theme  = 'b';

      $.mobile.page.prototype.options.headerTheme = 'b';
      $.mobile.page.prototype.options.contentTheme = 'b';

      $.mobile.page.prototype.options.footerTheme = 'b';
      $.mobile.page.prototype.options.backBtnTheme = 'b';

    }
  );
```

The APIs

From this section on, I'll start describing the APIs used throughout the project. Apart from the Google Maps API, the other two—that is the Geolocation API and the Web Storage API—are W3C specifications. We'll use this APIs through the Cordova framework, however some devices may already provide an implementation of these APIs. For those devices, we used their built-in support instead of the Cordova's implementation, but for those that don't have storage support, the Cordova implementation has been built to remain compatible with the W3C specs.

Managing the Locations

In this section I'll show you the class called Position, which is responsible for managing the locations. It's aim is to create, delete, and load the locations using the Web Storage API that is composed by two areas: the Session and the Local. Cordova uses the local storage because the storage is always at app level. All the locations will be stored in an item called "positions."

Before going on, I want to highlight two facts. The first is that to store complex data (like objects and arrays) using the Web Storage API, you have to use the JSON format. So, in the Position class methods, you'll see the use of the JSON class and its parse() and stringify() methods. The second is that Windows Phone 7 doesn't support the dot notation so, you must use the setItem() and getItem() methods to ensure the compatibility for all devices. This is just the first of a lot of quirks that you have to face while developing with Cordova. Since with "Where I parked my car" we're not targeting a

specific platform, you have to take into account the different support and the quirks of the Cordova API. Luckily, the first one we encountered wasn't so hard to deal with.
For the purpose of the app, we need to save the user's and car's latitude and longitude, but we also need the accuracy of the measurement to give the user an idea of how precise our locations are. I'll wrap the first three data into a class called Coords.

Reading coordinates isn't very user-friendly, so to enhance the user experience, we'll use the Google Maps API to retrieve the address of the current location. The app will also store the date and time associated with that GPS location. Remember that the app will store up to 50 locations, so if the limits is reached, the extra positions (the older ones) will be eliminated using the JavaScript slice() method.

For what discussed so far, the starting point of the Position class is implemented by the following code.

```
Function Position(position, address, datetime)
{

  var _db = window.localStorage;
  var MAX_POSITIONS = 50;

  this.getMaxPositions = function()
  {

    return MAX_POSITIONS;
  }

  this.position = position;
  this.address = address;

  this.datetime = datetime;
}

Function Coords(latitude, longitude, accuracy)
{

  this.latitude = latitude;
  this.longitude = longitude;

  this.accuracy = accuracy;
}
```

As you may have guessed, in the JavaScript sense of the object-oriented approach, the _db property is private and MAX_POSITIONS is a constant. With the given skeleton we can't do much, in fact, we need methods to let the application interface with the Web Storage API. These methods are
savePosition() to store the car's position

updatePosition() to update the last position retrieved with the address if the callback to the Google Maps API succeed
deletePosition() to allow the user to remove a previously saved position
getPositions() to load all the stored locations

In all the cited methods, I'll test if the database var (_db) is null and if it is, I'll show an error message to the user. I test for this state because I like to try to anticipate and manage unexpected interface problems. To show the message, I'll take advantage of the alert() method of the Cordova Notification API. Most of the supported platforms use a native dialog box, however, others (like Bada 2.X) use the well-known browser's alert() function's look and feel, which is less customizable. The Cordova alert() function accepts up to four parameters:
message: The string that contains the message to show
alertCallback: A callback to invoke when the alert dialog is dismissed
title: The title of the dialog (by default is "Alert")
buttonName: The text of the button included in the dialog (by default is "OK")
There's another quirk that we have to consider while developing with PhoneGap. Windows Phone 7 ignores the button name and always uses the default. And, there isn't a built-in browser alert, so if you want to use alert('message'); you have to assign window.alert = navigator.notification.alert. For a complete list of the differences between mobile operating systems, refer to the Cordova Notification alert() documentation.

4. CONCLUSION

In this third part, you've seen how to configure "Where you parked your car" to change the pages' transition, the option to show the text when showing the page loader widget, and the theme. You also learned how to store the car's positions using the Web Storage API. We'll show you the last two JavaScript files: maps.js, and functions.js. The former contains the functions to initialize the application and some other utility functions, while the latter has the functions that use the Google Maps API to draw the map and the route to the car.

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PUBLIC SECTOR BUSINESS RESULTS AND MARKET POSITION

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Abstract: *The aim of this paper is to identify and systematize the overall results of the public institutions of social activities. Total operating profit was observed in part related to doing business on the market and the part related to the financing from the budget. Such distinction should provide verification of the analytical consideration of their business and the position on a specific local market of social activities. Business results of the public institutions within the jurisdiction of the City of Leskovac as a local self-government unit, served as a basis for the analysis. The specificity of this approach stems from the lack of similar analysis in Serbia and the discovery of the possible importance of the market position of these institutions business to increase the total volume of the national income, in the framework of the new concept of gross domestic product. The reported results of institutions business show that the analytical approach is possible and desirable for these specific business subjects.*

Key words: institutions, social activities, business, revenues, expenses, assets, liabilities.

1. INTRODUCTION

Work and the establishment of institutions of social activities are regulated by the law from 1990, and in the meantime no particular law was adopted to regulate their work in a unique way. It is left to the special laws that regulate the functions of public interest in particular areas of social activities. These laws left the possibility that, in addition to the institutions established by the Republic and local governments, in activities of special public interest in the field of social activities, legal entities in private ownership are allowed to participate. This paper will be covered only by institutions founded by the City of Leskovac as a unit of local government or public institutions that are working in the City and their founder is the Republic of Serbia.

The presented regulation provides all institutions of social activities to that provide funds from the budget of the founders of the public funds but also in the market through participation of citizens themselves and regulated service payment on the market. In this way, apart from performing public functions through the budget distribution of national income, institutions perform an economic activity, too. This second part of their activities, according to the modern concept of gross domestic product, represents the contribution to the total newly formed income of the state, or the local government unit. The presented analysis included this segment, too as it provides possibility of insight into the degree of public influence of the management of the local government to increase its own national income. This approach derives from the clearer insights that there is a specific local social good, as a special form of local public good, which increases the available economic result [1]. In favor of this approach is contemporary debate about the concept of the so-called social capital, considering that it just lacks a quantitative approach. [2]

Business of institutions of social activities is derived on the basis of the completed balance sheets of all the institutions for 2011. In addition to these documents, the data compiled by the representatives of the institutions themselves in conjunction with the total number of employees and average monthly net earnings in the same year, were used. It's about the institutions founded by the City of Leskovac to perform certain activities from the original scope of its powers as a local government unit, which result from the Law on Local Self-Government in the fields of: education, child care, culture, sports, social and health care. To perform certain activities City has formed public companies (e.g. in sports). Some delegated activities were performed by institutions formed by the Republic of Serbia (high schools, the Center for Social Work, Gerontology Center). The total analysis included both groups in order to monitor the work of all institutions of social activities as a whole, on the territory of the City of Leskovac for complete services in the field of social activities.

For the purpose of analytical comparability, entire institutions' business will be considered in relation to the budget of the City of Leskovac partitions in the same year, that are related to intended social activity expenditures. This indicator should show the extent to which the performance of some of the work of social activities' services is done through the institution, and the extent to which the direct engagement of the budget, purchasing these services in the market and the implementation of projects is included.

Since the data have been collected from dozens of institutions on the City of Leskovac territory, in this paper individual data are not shown, but the summary was made by branches of the social activities. In this way it was possible to monitor the internal structure of the distribution of all funds earmarked for social activities and an overview of overall business results in any particular branch of social activities.

The analysis included 52 institutions operating on the City of Leskovac territory, as follows: 1 institution for the health care, 1 institution for the child care, 23 primary schools, 11 secondary schools, 3 social welfare institutions, 11 institutions dealing with culture and 2 institutions with sports. As all institutions of social activities that perform in any quantity their business from the City of Leskovac jurisdiction, being a local self-government, it stems that the remaining institutions, not encompassed by the analysis that operate in the City of Leskovac are: Health Protection Institute, Pension and Disability Insurance Fund, National Employment Service, Faculty of Technology, 2 colleges and General Hospital in Leskovac.

2. BUSINESS RESULTS

Basic data about the total income and expense from the income statement in 2011, served for the discussion on business results of the social activities institutions of the City of Leskovac. As the same shows previous data relating to 2010, they were also shown in the same structure. At the same time, these data enabled the real measurement of the total volume and performance of all institutions, in a way that the nominal growth was put on deflation by the general level of consumer prices in 2011, compared to 2010, for 11%. The relationship between income and expenditure achieved in the current year is used as a measure of total net operating results achieved, regardless of the fact that institutions of social activities do not have profit making as its objective function, but they have, as budget users, balancing of the balance sheet. The analysis makes it possible to consider the achieved results from the standpoint of the modern concept of the social activities economics [3].

Table 1 Total operational result of the public institutions of the city of Leskovac -In 000 RSD							
Area	**Current revenue**		**Real growth**	**Current expenditure**		**Real growth**	**Net result**
	2010	2011	Index	2010	2011	Index	2011
Health protection	862444	941641	102,5	855047	940660	99,1	-981
Elementary education	1039851	1141770	98,9	1008899	1103229	98,5	-38541
Secondary education	640957	685879	96,4	650191	687055	95,2	1176
Social welfare	143144	161827	101,8	135422	162121	107,9	294
Culture	211377	188478	80,3	208693	187296	80,9	-1182
Sport	46844	58128	111,8	58858	65513	100,3	7385
Child protection	242831	275980	102,4	241072	274696	102,7	-1284
Total	**3187448**	**3453703**	**97,6**	**3158182**	**3420570**	**97,6**	**-33133**

The total business volume of institutions of social activities in 2011 took place at the level of 3.4 (in previous year 3.2) billion RSD. Because of comparison with its immediate environment that makes the local public sector, it should be noted that this is the extent of the activity that is the most extensive in the area of the City of Leskovac! Thus, for example, in the same year, the budget funding of all users (even those in public institutions) took place at the level of 2.4 billion RSD, while the operations of public enterprises founded by the City of Leskovac, at the level of 1.2 billion RSD. This means that it is a part of the local public sector that is by the financial scope and the diversity of the activities, the most important in the City of Leskovac territory.

Dynamically speaking, the total income of all the institutions of social activities in 2011 was rated at a higher level than the previous 2010, but when it turns off inflation component, it was actually lower by 2.4% (in previous year - 2.2%). Within the scope of revenue achieved, there are achieved revenues of institutions of social services and the overall net result is slightly negative, with 33 million RSD or only 0.9% of the total revenue. It can be said that the overall business volume of all public institutions of social activities surveyed, on the City of Leskovac territory, is balanced and varied within the given budget restrictions and the opportunities on the market, except for primary education whose negative business result amounted to a total of 38 million RSD.

In regard to the total partition in the budget of the City of Leskovac for 2011, designed for all social activities in the amount of 750 million RSD, the total volume of financial activities was higher by 4.2 times, respectively the contribution of the budget of the City of Leskovac to the total revenue of public institutions of social activities was 24% (in previous year 28%). This means that the market revenues and especially the contribution of the Republic of Serbia budget and the Health Insurance Fund were more important for all the observed institutions of social activities of the City of Leskovac. If the analysis of the general funds includes funds of health insurance contributions as a local contribution to the financing of institutions of social activities, then the budget of the City of Leskovac and Health Insurance Fund had an impact on operating income of social services institutions with nearly one-third (29%). This significant contribution ratio of the local and the national budget to the expenditures of institutions of social activities in the City of Leskovac could be considered statistically relevant [4]. However, when the results are considered by certain social activities within the jurisdiction of the local government unit, business results of institutions could be understood better.

In the structure of total income (and expense) of all branches of social activities, three sectors are dominant: primary education with 1/3, health care with 27% and secondary education with 20%. Other branches of social activities have single-digit percentage participation and achieved significantly lower level compared to the three major branches, which at the same time, in spite of their significance, show the complexity of the network. From other branches of social services, the highest percentage has child care (with 8%), despite the very high funds from the city budget allocated for this purpose (from 7.8%) and widespread network of child institution services.

In all branches of social services expenses were greater than revenues, except in secondary education, social welfare and sport, where revenues exceeded the expenditures by 1.1 and 294,000 and 7.4 million RSD, respectively. From individual institutions that have contributed most to the overall negative business result of its branch, in primary education, schools "Svetozar Markovic" in Leskovac with 213.6 million RSD and "Vuk Karadzic" in Pecenjevce with 6.7 million RSD stand out. Other institutions have had individually balanced balance sheets and the positive and negative operating results were of very low volume.

3. REVENUE STRUCTURE

Revenue structure of institutions of social activities is viewed from two points of view, in terms of their public activity and sources of income. First of all, revenues from the budget are allocated, where they could not be separated revenues from the city's and state budget, as submitted balance sheets, relating to this structure, were not filled in by the Chartered Accountants. On the other hand, a source of income that is realized in the market, will be considered, i.e. participation of service users. The relationship between these two sources, indicates the extent to which institutions of social activities generate revenue by performing activities of public interest and the income generated after the local distribution of national income, and in which the market, which is the contribution indicator of these institutions to the total national income of the City of Leskovac.

Table 2 Breakdown of total revenues of the institutions of social activities *-In 000 RSD*

Area	Budget revenue		Real growth 2011/10	The share of revenue from the budget in total revenue 2011	Revenue from sales of goods and services		Real growth (index)
	2010	2011	Index	In %	2010	2011	2011/10
Health protection	5159	1970	34,4	0,2	40085	42086	94,6
Elementary education	963325	1045339	97,8	91,6	76433	77914	193,1
Secondary education	582225	629063	97,3	91,7	43067	42463	88,8
Social welfare	94673	110846	105,5	68,5	21725	23805	98,7
Culture	187784	167991	80,6	89,1	4378	9486	195,2
Sport	50146	50933	91,5	87,6	5906	6739	102,8
Child protection	198339	218702	99,3	79,2	40407	49326	110,0
Total	**2031505**	**2224844**	**98,7**	**64,4**	**191916**	**251819**	**118,2**

Revenues of all included institutions that promote social activities, from the budget (the City or the Republic) of 2.2 billion make up 64% of all revenues from these institutions. This structure is a real consequence of the public position of institutions of social activities, but it is inaccurate in part because health care facilities revenue does not come from the budget but from the Health Insurance Fund. If these assets are included in the income of the Health Center in Leskovac, then the structure of income from public sources (not just from the budget) will greatly change. Total revenue growth from the budget in 2011 was in real terms lower by 1.3% compared to the previous year, which means that the financial requirements for conducting public institutions services are balanced supported with the funds from public sources. This negative result was contributed by revenue sources from the budget devoted to all branches of social activities, except social welfare, that only had real higher revenues compared to 2010 by 5%. It can be concluded that the policy of supporting public institutions from the city and the republic budget in 2011, descended to a lower level.

Apart from that, the revenue from the sale of goods and services generated by the institutions of social activities on the market by selling their services, i.e. by citizens' participation, increased in real terms by 18% compared to the previous 2010. This was predominantly contributed by the primary education and culture with their incomes from the market almost twice really increased. The fact that all institutions of social activities generated a negative business result is caused by the fact that it is located on the expense side of the income statement or on the side of the net revenues from the budget. This means that due to the deteriorating situation in the primary and secondary distribution, institutions undertake activities on a smaller scale than expected, so the negative result as a loss was transferred to the next (current) year.

In the structure of total revenues, the largest revenue contribution is from the education budget with over 90% and the lowest is in social welfare with 68%. In the latter, market revenues amounted to 14.7%, so, it can be concluded that some other incomes (grants, loans, etc.) with almost 17%, were an important source of income for social welfare institutions. This result was contributed more by Gerontology Center, as the Center for social work, as well as other major social welfare institution, with over 96% of total revenues achieved by budget revenues, and the rest also by not selling its services on the market, since, due to the activity it performs, such services in the income statement are not recorded. It can be said that the revenue on the market, of 250 million RSD, institutions of social activities **have increased the estimated gross domestic product of Leskovac by 1%.**

For child care i.e. for child institution "Vukica Mitrovic", the relationship between the share of the budget and service users was 80:18 and the remaining 2% were funded in a different way. This proportion reached, shows the disrupted usual relationship between the budget and the personal financing of services from 80:20, but it is not in violation of considerable extent. It is a consequence of the increase in real income from the participation of service users (10%) compared to the real reduction of budget revenues (-0.7%).

4. STRUCTURE OF EXPENDITURES

Expenditure structure of institutions of social activities is similar to the revenue structure, viewed from the point of view of the two largest consumers. Given the high labor intensity of the activity, in their structure, an emphasis is on staff expenses. On the other hand, the proportion of expenditures for services that are purchased on the market by institutions is observed. This proportion will depend on the technological nature of the activities and it will be observed when considering the results presented in the following table.

Table 3 Structure of total expenditures of institutions of social activities *-In 000 RSD*

Area	Expenses for employees		Real growth 2011/2010	The share of payroll expenditures in total expenditures 2011 (%)	Expenses of goods and services		Real growth 2011/2010 (Index)
	2010	2011	Index		2010	2011	
Health protection	711061	778492	98,6	82,8	142711	160419	101,3
Elementary education	945352	999929	95,3	90,6	53739	84333	141,4
Secondary education	573581	617674	97,0	89,9	61135	57876	85,3
Social welfare	80820	89902	100,2	55,5	37670	52997	126,7
Culture	172144	154710	81,0	82,6	34143	28040	74,0
Sport	51755	52118	90,7	79,6	2072	1383	60,1
Child protection	179789	204224	102,3	74,3	60630	70038	104,1
Total	2662747	2897049	98,0	84,7	392100	455086	104,6

In general, the structure of expenditures for all institutions of social activities in 2011 is committed to spending 85% for employees (previous year: 80%), which is fully consistent with the character of these services sector. Except for the social care institutions, all other institutions have this character. Slightly lower proportion in social protection (55%) is a consequence of significantly different cost nature of Gerontology Center, due to the provision of accommodation and food services to its customers. So, expenses of services and goods, of the institution in 2011 amount to 38% of total expenditures.

The total real growth in spending on employees (as opposed to spending on goods and services) in 2011 was negative (-2%), which indicates that these institutions' expenses did not comply with their real capabilities. As previously determined that real incomes in general and in the major structures were negative, it confirms the non-optimal disposition of the expenditure side of the balance sheet in all the institutions. The only real growth in spending on employees has been made in the social welfare (0.2%) and child care (2.3%), as a result of coordinated growth in total employment, since these institutions in the past year, really have much higher real growth in expenditure for employees. It can be said that the overall operations of all public institutions of social activities surveyed in the City of Leskovac is balanced at a somewhat lower level and that they moved within the given budget restrictions and the opportunities on the market.

On the other hand, any institution other than high schools, culture and sport, have had a positive growth rate of total expenditure for goods and services, which says about their increased activities in their regular business activity. All these activities were in line with the revenue side, and there were no wild swings in the overall financial result compared with the steady state revenue and expenditure, as previously determined. In general, these expenditures amounted to only 13% of total expenditures, so, they could not have a more significant impact on the overall business results.

5. EMPLOYMENT AND AVERAGE NET EARNINGS

Information on the number of employees in institutions of social activities in 2011 was received from the institutions themselves, since this information is not a part of the annual balance sheet, as is the case with the realized average monthly net earnings, as in the balance gross payroll is evidenced. For realized net earnings there is no significant inconsistency, since earnings are determined by general rules and therefore are uniform within registered social activities branches.

All available data and calculations that were performed to determine the relative ratio with the immediate surroundings are entered in the following table. Thus, the average net salary in the institutions of social activities compared with the average realized net salary in non-economy sectors on the territory of the City of Leskovac is 34.523 RSD, as compared to net salary in the Republic of Serbia of 37.687 RSD.

Table 4. Total number of employees and average wage of institutions ***-In RSD.***

Area	Number of employees 2010	Total expenses per employee 2011	Average net salary 2011	The share of the gross wage fund in total expenditure 2011 (%)	Net salary comparing to the average one in the city of Leskovac	Net salary comparing to the average one in the Republic of Serbia
Health protection	1007	934,1	38890	75,6	133,6	102,3
Elementary education	1430	771,5	37164	89,7	127,6	97,8
Secondary education	848	810,2	26371	90,6	90,6	69,4
Social welfare	137	1183,4	34721	45,2	119,2	91,4
Culture	212	883,5	36404	73,5	125,0	95,8
Sport	110	595,6	24466	79,6	84,0	64,4
Child protection	294	934,3	30840	74,3	105,9	81,2
Total	3928	870,8	34977	81,6	120,1	92,0

Total number of employees in the covered institutions of social activity that is certainly much higher than 3900 is a significant contingent of employment in the City of Leskovac as local government unit in 2011. In the same year the total registered number of employees amounted to 24000 so the respective institutions participated in total employment with 16%. In relation to the total number of employees in the so-called non-economic activities (which include state and local government bodies) of 7500, employment in the social sector institutions is **half-over**. This confirms the importance of these activities for non-economic employment but also the breadth of coverage of the sample under consideration.

Accrual indicator "total expenses per employee" is entered in the table in order to determine the possible variability of the labor intensity of some of the social activities on the City of Leskovac territory. Except for the social welfare, this indicator is uniform around the average for all other sectors of the social activities. This shows that in terms of scope of services and the available number of employees involved in these services, a very high level of harmony is achieved, so, that for no branch of social activities in the City of Leskovac there is a threat or overvaluation of its role on the public market of these specific services. Multiannual brevity of economic policy in this area is shown here in action as consistent.

On the other side, the indicator in the table "share of gross wages fund in total expenditure" is supposed to show the relative impact on overall earnings themselves to total expenditures in relation to other staff costs. It as a whole remains high, indicating that other staff costs are not significant.

In 2011, the realized net salary in all institutions of social activities in the City of Leskovac was 35,000 RSD and when compared to the average net salaries of the City of Leskovac or the Republic of Serbia, it is 20% higher than the first one and 8% lower than the second one. Such is the case in all branches of social activities, except for health care, given the high employee structure in health care which only achieved an average net salary in excess of those earned in the Republic of Serbia. The lower level of earnings relative to the average for the City of Leskovac in sectors of Secondary Education and Sport, indicate a lower professional intensity of these institutions of social activities relative to that in the second part of the non-economic employment (management). However, the average net salary is much higher than that achieved in the economy of the City of Leskovac in the previous year (21,772 RSD), so, it can be concluded that the part of public sector employees, who are considered here, are in a more favorable position with respect to employees from their immediate environment. Relative ratios compared to the previous 2010 are not measured because since 2011 no more official statistics on the average net salary in non- economy and the economy in particular were recorded.

6. ASSET STRUCTURE AND OBLIGATIONS

Balance sheet structure of institutions of social activities will include both sides of the balance - assets and liabilities, in the same analytical method as in any enterprise [5]. Property status at the end of 2011 will be considered in the first case, with which the institutions of social activities disposed and success in managing funds i.e. the total volume and structure of obligations that the institutions of social activities had in 2011 in the second case.

Table 5 The structure of the total assets of the institutions of social activities - In RSD

Area	Assets total		Real growth 2011/10	Property in fixed assets		The share of fixed assets in the assets	
	2010	2011	Index	2010	2011	2010	2011
Health protection	216105	204941	88,5	205696	194813	95,2	95,1
Elementary education	715187	755829	98,6	607993	703961	85,0	93,1
Secondary education	522359	554722	99,1	421249	411986	80,6	74,3
Social welfare	90798	91431	93,9	89515	90077	98,6	98,5
Culture	146735	140582	89,4	75020	73544	51,1	52,3
Sport	197882	195668	92,2	197882	195668	100,0	100,0
Child protection	173250	158251	85,2	102516	99350	59,2	62,8
Total	2062316	2101424	95,1	1699871	1769399	82,4	93,5

Total assets of disposal with which all institutions of social activities in 2011 amounted to over two billion RSD and realistically were 5% lower than the previous year (when it was 5% higher). The existing dynamic result, the only positive contribution was made by child-care institution, as all other institutions, damping property which they hold, reduce its level of preservation. In absolute terms, the largest quantum of assets is assigned to primary education (36%), secondary education (26%), health care (10%) and sports (9%). Other branches of social activities generate share expressed with single-digit percentage figures and even child care (7.5%), which is the most demanding activity regarding property but it appears that the property is not recorded in the balance sheet. This structure is the result of many years of investment dynamics and the development of the network of social activities institutions but also incomplete recording of the property, which the institutions of social activity hold, due to unclear ownership structure of state and local governments on the one side and social services institutions on the other side.

The share of fixed assets in the total assets shows the volume of property and equipment which are available to the institution of social activities. It is the highest in sports (100%), social welfare (98%), health care (95%) and primary education (93%) while other branches of social activities do not have a significant amount of real estate. Or to be

more precise - do not appear in their balance sheets as assets are only used by the beneficiary but the assets still belong to the founder. As given, in the mentioned branches of social activities fixed assets dominate the overall activity, then the total share of the fixed assets of all institutions of social activities is half-over comparing to the total available assets. The fact declining real growth of fixed assets in 2011 is not encouraging compared to the previous year, but it is probably the dominant consequence of non-activation of new fixed assets in any one branch of social activities on the City of Leskovac territory, so, almost all branches of social activities reduced their share of fixed assets in total assets because of depreciation of fixed assets.
Passive balance sheet activities of social institutions in 2011, and previous 2010, will be considered in the table below.

Table 6: Liabilities structure of institutions of social activities of Leskovac ***-In 000 RSD.***

Area	Total liabilities		The share of liabilities in total liabilities in %		Structure of liabilities in 2011		The share of operating liabilities in total liabilities of 2011 in %
	2010	2011	2010	2011	To employees	Operating	
Health protection	36601	39996	16,9	19,5	0	33450	83,6
Elementary education	48063	64101	6,7	8,5	2762	61410	95,8
Secondary education	99579	142168	19,1	25,6	27035	101623	71,5
Social welfare	23681	24032	26,1	26,3	5339	7072	29,4
Culture	103574	95613	70,6	68,0	40813	48559	50,8
Sport	37791	43721	19,1	22,3	0	8323	19,0
Child protection	67892	54929	39,2	34,7	41146	2490	4,5
Total	379390	464560	20,3	22,1	117095	262927	56,6

Data about the total liabilities of the institutions of social activities of 464 million RSD in 2011 shows that this is a relatively low volume of outstanding liabilities transferred in 2012. In comparison to the revenue of all institutions in 2011, it's only 13%, which confirms this statement. This result is consistent with the character of the business process that takes place in these institutions, which usually do not take high responsibilities in the market because it was not their dominant field of business [6]. Therefore, the point is that the liabilities incurred by the end of this year according to an established schedule can be met at the beginning of next year. This confirms the data about relatively low volume of commitments in relation to the total amount of liabilities of 22%, which is at the same time, however, the relatively increase compared to the moment of a year ago, for two structural percentage points.

In absolute terms, a larger volume of transferred liabilities in 2012 is realized in institutions of secondary education (142 million RSD), culture (95 million RSD) and primary education (about 64 million RSD.). In these institutions the share of liabilities in total liabilities increased significantly compared to the previous year balance sheet (except in culture), so it can be concluded that 2012 passed in relatively worse atmosphere regarding inflows and dynamics of meeting current business obligations, since the relative burden of liabilities increased by two percentage points structure.

The characteristic of the structure of the institutions of social activities obligations in 2011 is that it is not formed based on employees but the majority from doing business (57%). Significant liabilities to employees are transferred to the following year, 2012, only in the field of culture (40 million RSD) and secondary education (27 million RSD) while in the field of sports and health care it is evident that transferred liabilities are not recorded in the balance sheet.

Half of the total obligations carried forward relate to liabilities and amount to 263 million RSD, which is a significant increase compared to the previous year when it was about 170 million RSD. Somewhat larger amounts are in the field of education (primary and secondary), culture and health care and their character is dominant in relation to total liabilities. They are not of such extent as to endanger on-going business so it can be concluded that the current receipts and commitments in the same 2012 are able to meet regularly in all the institutions of social activities, not to cause disruption in the current business.

7. CONCLUSION

The analysis included 52 public institutions of social activities that operate on the City of Leskovac territory. On the whole, in 2011 these institutions made revenue of total 3,4 billion RSD and according to the absolute volume are the largest single segment of the public sector of the City of Leskovac, because their incomes are higher than the annual budget of the City of Leskovac (2,4 billion RSD) as well as the total revenues of its public enterprises (1,2 billion RSD).

Overall business of all public institutions of social activities surveyed in the City of Leskovac in 2011 was balanced on the real slightly lower level (2,4%) than in the previous year and within the given budget restrictions on the opportunities in the market. In the structure of total revenue, sources from the municipal budget and the Republic of Serbia with more than 2/3 were dominant, which is an essential feature of the method of funding the activities carried out by these institutions. Business income from the market statistically increases estimated national income of Leskovac by 1%, which can be considered as a significant contribution to the business of public institutions to local gross domestic product.

Decline in real expenditures of institutions of social activities in 2011 was somewhat lower than the previous year at the same level as the revenue side. Given the labor intensity of service delivery of social services, staff expenses in the structure of expenditures are dominated with 85% and expenses for the purchase of goods and services by 13% could not disruptive influence on the dynamics of the business.

Considered the institution of social activities with the total number of employees from 3900, include over-half most non-economic employment in the City of Leskovac. An average monthly net wage of 35000 RSD puts institutions of social activities far above the average in economic but also its overall monthly wage achieved in the City of Leskovac, which expresses its favorable position in the local labor market. On the other hand, such earnings were below the average net salary in Serbia, which is the term of lower professional intensity with respect to employees in the Republic.

The total value of the property which was at disposal of all institutes of social activities in 2011 amounted to over 2 billion RSD, and was distributed mostly in primary education (36%), secondary education (26%), health care (10%) and sports (9%). This structure is a consequence of the network development of institutions of social activities but also incomplete property recording which the institution of social activities hold, given the unclear ownership structure of state and local governments on the one hand and social services institutions on the other. That is why in the total assets structure, the proportion of fixed assets (buildings and equipment) is over 3/4, which is a real expression of property structures of institutions of social activities.

The balanced operation of the social activities institutions in 2011 is shown with a relatively low level of liabilities transferred in 2012 of only 13% of the total income in a given fiscal year. This result is consistent with the character of the business process that takes place in these institutions, which usually do not take high responsibilities on the market because it was not their dominant field of business.

It can be concluded that the analysis of the business of public institutions of social activities provides insight into their real balance sheet structure, which in addition to the budget, in itself, partly includes a substantial component of the market. This completes the missing quantitative segment in scope of the modern concept of social capital and its economics. With the above findings, analytical approach to this particular segment of the modern market structure will open comparative review with the private sector which will be more and more involved in doing business in the field of social activities.

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UDK: 005.52(497.11) ; 338.1(497.11) ID: 196830732 **Review Article**

IMPORTANCE OF LOCAL SELF-GOVERNMENT SUPPORT TO SMES IN THE CITY OF NIS

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1. INTRODUCTION

Dynamic entrepreneurs are particularly well placed to reap opportunities from globalisation and from the acceleration of technological change. Our capacity to build on the growth and innovation potential of small and medium-sized enterprises (SMEs) will therefore be decisive for the future prosperity of the EU. In a globally changing landscape characterised by continuous structural changes and enhanced competitive pressures, the role of SMEs in our society has become even more important as providers of employment opportunities and key players for the wellbeing of local and regional communities. Vibrant SMEs will make Europe more robust to stand against the uncertainty thrown up in the globalised world of today. The EU has thus firmly placed the needs of SMEs at the heart of numerous strategies.

The national and local environments in which SMEs operate are very different and so is the nature of SMEs themselves (including crafts, micro-enterprises, family owned or social economy enterprises) [4].

Small Business Act for Europe was adopted in June 2008 and it reflects the Commission's political will to recognise the central role of SMEs in the EU economy. It aims to improve the overall approach to entrepreneurship, permanently anchor the 'Think Small First' principle in policy making from regulation to public service, and to promote SMEs' growth by helping them tackle the remaining problems which hamper their development. The Small Business Act (SBA) for Europe applies to all independent companies which have fewer than 250 employees: 99% of all European businesses [4].

According to the data provided by the Serbian National Statistical Office, Serbia's SME sector has a higher share of small, medium, and large companies than the EU average. Micro firms are thus comparatively less prevalent.

The SME sector contributes less to employment and value-added than in the EU, but it still accounts for more than half of all workers in the business economy, and half of the contribution to gross domestic product.

On average, SMEs in Serbia employ 7.3 workers, which is significantly higher than the 4.5 EU average, suggesting a need to do more to develop Serbia's framework conditions for entrepreneurship.

SMEs in Serbia are concentrated in the business service sector, followed by trade, transport, tourism, construction and manufacturing.

	Number of Enterprises			Employment			Value added		
	Serbia		EU27	Serbia		EU27	Serbia		EU27
	Number	Share	Share	Number	Share	Share	Million €	Share	Share
Micro	72.062	86,2%	92,1%	207.164	20,2%	29,8%	1.730	13,3%	21,6%
Small	8.939	10,7%	6,6%	180.875	17,7%	20,4%	2.436	18,8%	18,9%
Medium-sized	2.121	2,5%	1,1%	222.425	21,7%	16,8%	2.341	18,0%	17,9%
SMEs	**83.122**	**99,4%**	**99,8%**	**610.464**	**59,7%**	**66,9%**	**6.507**	**50,1%**	**58,4%**
Large	509	0,6%	0,2%	412.884	40,3%	33,1%	6.469	49,9%	41,6%
Total	**83.631**	**100,0%**	**100,0%**	**1.023.348**	**100,0%**	**100,0%**	**12.976**	**100,0%**	**100,0%**

The 2010 figures have been provided by Serbia's National Statistical Office.The data cover the 'business economy' which includes industry, construction, trade, and services (NACE Rev. 2 Sections B to J, L, M, N). The data does not cover the enterprises in agriculture, forestry, fishing or the largely non-market services such as education and health.

Table 1. SMEs in Serbia — basic figures [1]

Having in mind that world economies nourish SME development in order to boost the economic development or to overcome the consequences caused by the crisis, or in our case the transition period, Serbia also supports the SME sector development. There are numerous mechanisms for strengthening this sector but it is essential that the approach is systematic. Therefore, this paper will discuss the means how a local self-government can support the SME development by resolving their problems and implementing measures which would secure their development and start-ups.

A general conclusion derived from most of the researches in the existing economy in Serbia states that there is not sufficient support, neither on the local or the republic level, understanding and communication between the administration and the existing business community. Although the general aim of each and every local self-government in Serbia is to have healthy local economy and good business climate, there are no concrete examples of the cooperation between the two entities [3].

Therefore, there was a quite a successful programme which supported SME development in Serbia and it was called the Business Retention and Expansion programme in Serbia by USAID MEGA. This programme aimed at preventing job loss, retaining existing SMEs, supporting job creation, attracting new investors through the existing SMEs content with the business climate, re-establishing the cooperation between the local business community and the public administration.

The most important measure was envisaged in the business sector opinion analysis which gave the guidelines for the local self-government which wanted to resolve SME problems, create the business friendly environment for SME development and start-ups. In the paper we will present how the business sector opinion analysis was done on the territory of the City of Nis and what were the results.

2. EUROPEAN SME PERSPECTIVE AND SERBIAN SME REALITY

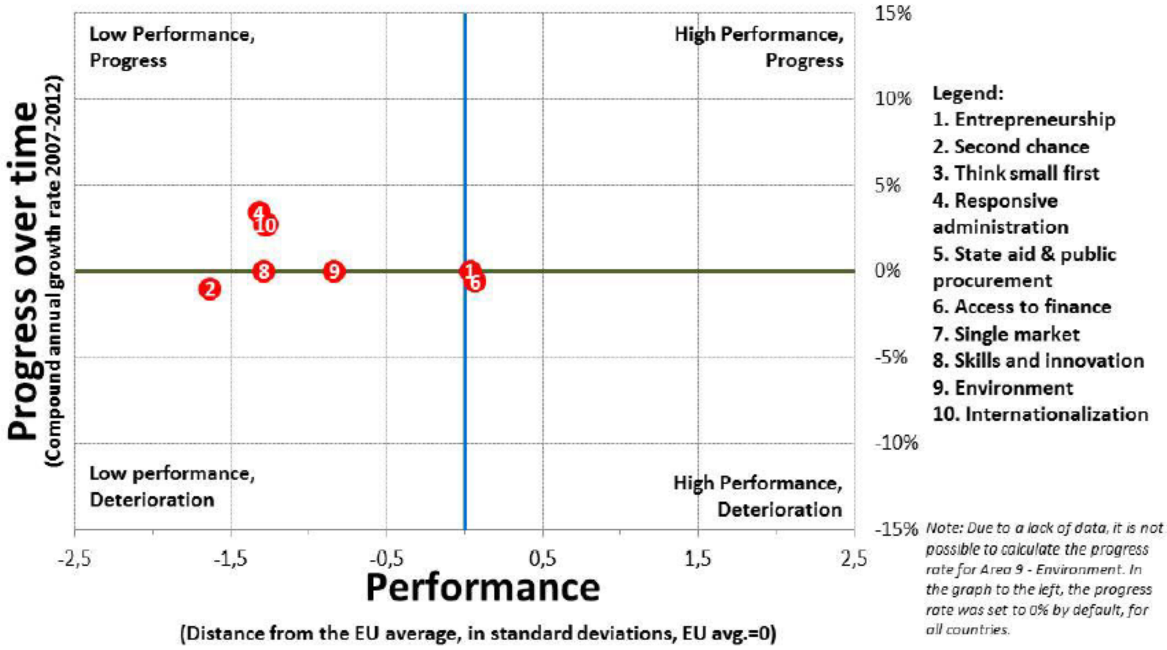
At the heart of the European SBA is the conviction that achieving the best possible framework conditions for SMEs depends first and foremost on society's recognition of entrepreneurs. The general climate in society should lead individuals to consider the option of starting their own business as attractive, and acknowledge that SMEs contribute substantially to employment growth and economic prosperity. As a key contribution to achieving an SME friendly environment, the perception of the role of entrepreneurs and risk-taking in the EU will therefore have to change: entrepreneurship and the associated willingness to take risks should be applauded by political leaders and the media, and supported by administrations. Being SME-friendly should become mainstream policy, based on the conviction that rules must respect the majority of those who will use them: the ”Think Small First” principle. The SBA builds on the Commission’s and Member States’ policy achievements, creates a new policy framework which integrates the existing enterprise policy instruments, and builds in particular on the European Charter for Small Enterprises and the Modern SME policy [4].

European Union is making effort to improve the business climate and support the growth of SMEs though various policies and measures. Therefore, the Small Business Act for Europe envisages a set of 10 principles to guide the conception and implementation of policies both at EU and Member State level:

1. Create an environment in which entrepreneurs and family businesses can thrive and entrepreneurship is rewarded,
2. Ensure that honest entrepreneurs who have faced bankruptcy quickly get a second chance,
3. Design rules according to the “Think Small First” principle,
4. Make public administrations responsive to SMEs’ needs,
5. Adapt public policy tools to SME needs: facilitate SMEs’ participation in public procurement and better use State Aid possibilities for SMEs,
6. Facilitate SMEs’ access to finance and develop a legal and business environment supportive to timely payments in commercial transactions,
7. Help SMEs to benefit more from the opportunities offered by the Single Market,
8. Promote the upgrading of skills in SMEs and all forms of innovation,
9. Enable SMEs to turn environmental challenges into opportunities,
10. Encourage and support SMEs to benefit from the growth of markets [4].

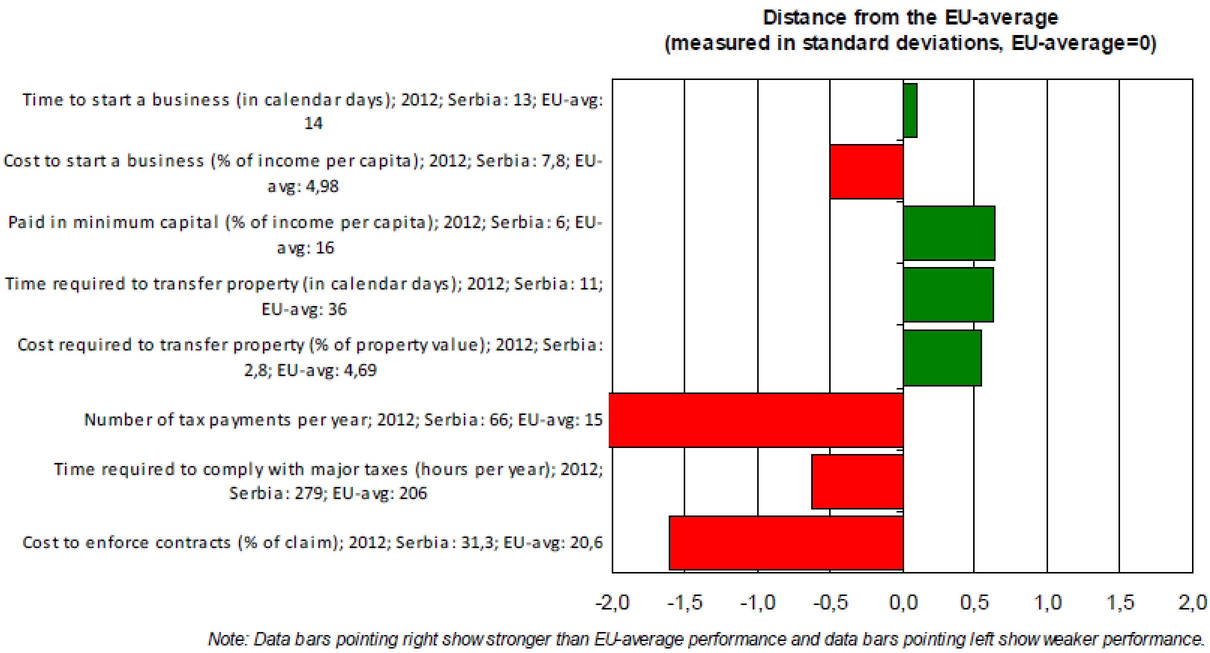
As presented, local administrations should make effort to create the business friendly environment and to become responsive to SME needs which will be discussed in the paper, especially though a good practice example of simply asking the SMEs what they need.

Serbia is trailing behind the average in comparison to the EU according to those 10 SBA principles. However, Serbian performance in Entrepreneurship and Access to Finance is slightly above average but it needs to improve its performance in Responsive administration, Internationalisation, Environment, Skills and innovation, and Second chance as shown in Graph 1.



Graph 1. Serbia's SBA performance: Status quo and development over 2007-2012 [1]

Hereby, we will continue our discussion but only regarding the responsive administration issue having in mind that support to SMEs in Serbia could improve significantly. Graph 2. presents responsive administration segments in Serbia in comparison to EU average but on the republic level. Most of the issues are subject to republic institutions and national strategic action plans and programmes.



Graph 2. Analysis of responsive administration segments in Serbia in comparison to EU average

Generally there are no significant changes in comparison to the previous year. The time required to transfer a property was reduced to 11 days from 91 the year before. Although it takes almost the same time to start a business in Serbia as in the EU in general, the cost of doing so is almost 15% higher. On the other hand, businesses have to pay in much less start capital. Tax payments are relatively higher, as is the time it takes to deal with them, and this could be considered as an administrative burden on SMEs in Serbia. On the policy front, various measures were taken. A new Law on Registration enabled all documents related to business registration to be submitted electronically, thus reducing registration time and getting closer to the SBA Action Plan recommendation. This innovation will also achieve savings of some EUR 1 million annually. Further electronic innovations concern the electronic submission of VAT forms, which came into force in June 2011. Another important change in the Serbian legislation concerns minimum capital — which fell for LLCs by almost 500 times, to around one euro.

3. BUSINESS SECTOR OPINION ANALYSIS

Having in mind the current situation and existing SME support measures on the European level and partly the national level, and knowing that the situation on the local level is specific due to the level of the economic development, predominant industry and social and economic factors, we will present a good practice example of providing support and investigating opinions to SMEs on the territory of the City of Nis.
The basic aim of conducting the Business Sector Opinion analysis was to learn something about the current state, wishes, needs, problems of the business community and to determine means of eliminating problems in cooperation between the local self-government and the business community [2].

The survey conducted in 2009 encompassed 71 SMEs (total number of employees 9.731), while the survey conducted in 2011 encompassed 120 SMEs (total number of employees 9.623). We will present the comparative analyses between findings from 2009 and 2011 so that we can see if and to what extent the local self-government adopted guidelines from the surveys.

SMEs usually identified as negative factors for their current and future development general economic situation (as in 2009), material costs, components, etc., national legislation (as in 2009), interest rates (as in 2009).

The quality of services provided by the local self-government was marked with sufficient. The results were quantified though the Likert scale with 5 categories, where 5 is the highest and 2 the lowest, while 1 represented those without opinion.

Service	2009	2011	Increased by
Offer of locations and premises	1.23	2.48	***1.25***
Support to SMEs	1.29	2.43	***1.14***
Public transport	2.02	3	0.98
Road maintenance	1.44	2.43	0.99
Infrastructure development	1.45	2.71	***1.26***
Public safety	2.5	2.94	0.44
Construction permits	1.2	2.21	1.01
Permits for businesses	2	2.6	0.6

Waste disposal	1.98	3	1.02
Housing	2.41	2.82	0.41
Total average	**1.75**	**2.66**	**0.91**

Table 2. Comparative analysis of the public service quality analysis

The local self-government in 2009 was evaluated by the total average of 1,75 while in 2011 it was 2,66. The worst services were issuing construction permits (2,21), road maintenance (2,43) and support to SMEs (2,43). The best services were public transport (3), waste disposal (3) and public safety (2,94).

It is remarkable how those categories which had the least points in 2009, resulted in the highest increase in 2011. This is characteristic for infrastructure development where the average mark increased from 1,45 to 2,71. The same goes for the offer of locations and premises from 1,23 to 2,48. On average the mark increased by 0.91 (Table 2.). When asked which services the local self-government should improve fist the answer was issuing construction permits (as in 2009), support to SMEs and road maintenance.

In 2011 the SMEs were asked which services the local self-government should provide in order to develop the local economy and the results are shown in Table 3. Most of the SMEs think that the local self-government should, as in 2009, deal with actively attracting investments, tax incentives and financial support for SMEs.

Statement	I agree	I partially agree	I partially disagree	I do not agree	NA
Free of charge locations	61	16	4	5	14
Tax incentives	***65***	20	2	1	12
Business incubators	40	32	5	***7***	16
SME support centres	59	23	2	4	12
Support to local companies	58	21	2	4	15
Active investment attraction	***71***	12	0	2	15
Economic development experts	45	24	8	***9***	14
Financial support to SMEs	***64***	20	1	2	13
Human resource development	61	18	6	1	14
Direct assistance to management	37	19	13	***16***	15
Ethic codex	54	17	11	2	16

Table 3. Role of the local self-government in the economic development

The local self-government was in general rated with satisfactory. Only 2% of SMEs rated it with exceptional, while 12% with good. 44% of SMEs said that the efforts of the local self-government were satisfactory, 20% said it was bad, and 22% did not answer.

Out of 88 SMEs which answered how they see the local self-government as a business hub said that it was exceptional, 15 said it was good, 37 said that it was satisfactory and 34 said that it was bad. When these results are compared with those from 2009 we get the following table (Table 4.).

	2009		2011	
	Absolute	**%**	**Absolute**	**%**
Exceptional	1	1.41%	2	2.00%
Good	5	7.04%	15	15.00%
Satisfactory	34	47.89%	37	37.00%
Bad	29	40.85%	34	34.00%
NA	2	2.82%	12	12.00%
Total	**71**	**100.00%**	**100**	**100.00%**

Table 4. Opinion on how they see the local self-government as a business hub

As key advantages of the City of Nis and doing business in it numerous companies stated geographical position, good transport connectivity, the scope of the local market, presence of institutions, airport, readiness of the local self-government for cooperation, presence of the university and the possibility to secure the required human resources, etc. On the other hand, companies identified major problems: high unemployment rate, low purchasing power, small market, insufficient financial resources and the assistance from the state entities, too much bureaucracy, centralization of the country, illiquid economy, lack of support to SMEs, lack of investment projects, legislatives.

What companies think about the strategic economic development plan of the city is highly important. By analysing their opinions, most of them think that the development of SMEs should be the priority (63%), then providing support to companies (56%) which was the priority in 2009, and the attraction of FDI (42%). All of the companies think that the transfer of technology is the least relevant task in the strategic economic development plan of the city (Photo 1).

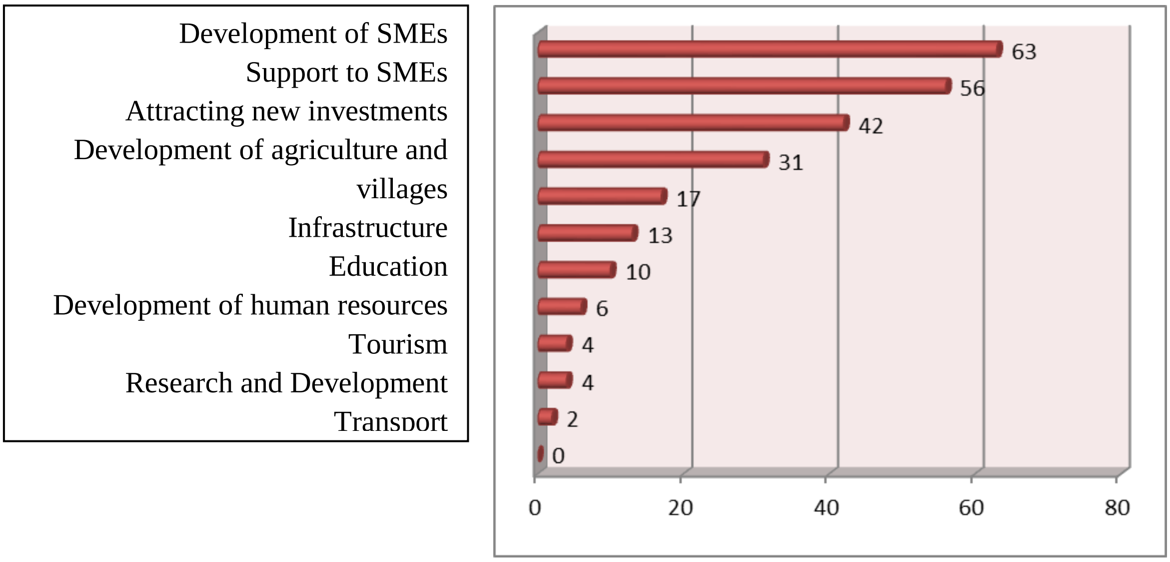


Photo 1. *Priorities which should comprise the strategic economic development plan of the city*

4.CONCLUSION

Managing the transition towards a knowledge-based economy is the key challenge for the EU today. Success will ensure a competitive and dynamic economy with more and better jobs and a higher level of social cohesion.
Therefore, European community should make effort to make room for SME sector to bloom in order to overcome the existing problems the SME sector has, providing the business friendly environment and supporting start-ups.

National and business competitiveness of Serbia is quite low. This resulted in the need to search for the approved ways of gaining and maintaining competitiveness of all sectors. It is vital that all of the stakeholders are included in this process.
The local self-government has a substantial role in this endeavour, especially when overcoming the following: inefficiency of the public sector when providing services, old infrastructure and equipment, narrow scope and low quality of public services, lack of qualifies human resources, lack of financial resources for improving the infrastructure and public services.

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UDK: 7.05:646.6 ID: 196831756 **Review Article**

SYMMETRY IN NATURE AND SYMMETRY IN FASHION DESIGN

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***Abstract**: The basic types of symmetry are four. They are reflection or bilateral; rotation or radial; translation; and helical or spiral. Every other type of symmetry is a combination of some symmetries of one of basic type, or between different basic types of symmetry. The paper presents design of collars of ladies' dresses with use of different types of symmetry, which are inspired by symmetry in nature. The collars are chosen as a special case of fashion design. The symmetrical and asymmetrical balance in fashion composition with the use of every type of symmetry, which can be found in nature, and their combination with other principles of composition are very successful way for designing of attractive ladies' garments with definite purpose and character. That combination is found in the use of suitable geometrical form of lines and appropriate colors, according to their associations and the nature is a source of forms and color, and their harmonious combinations.*
***Key words**: symmetry, fashion design, collars.*

1. INTRODUCTION

The balance is one of the principles of design composition. The balance can be symmetrical or asymmetrical. [1] The symmetrical one is based on the four basic types of symmetry, which are reflection or bilateral [1] [2]; rotation or radial [1] [2]; translation; and helical or spiral; or combination between types. [3]

The different types of symmetry in the forms in nature can be used as ideas in fashion design. It is usually considered that a symmetrical composition in clothing is this one which is based on reflection or bilateral symmetry, because of this type of symmetry in the human body. But every other type of symmetry can be used in fashion design, especially in the shape of particular detail or element. The radial, translation and helical symmetry can be used in the both form of balance in the clothing composition – symmetrical composition of a garment (based of the bilateral composition of the human body) or asymmetrical one (different right and left parts of a garment).

The paper presents design of collars of ladies' dresses with the use of different types of symmetry, which are inspired by symmetry in nature. The collars are chosen as a special case of fashion design.

2. SYMMETRY IN NATURE

The beautiful dragonfly, presented in figure 1, is an excellent example for bilateral symmetry. The more flowers are formed by radial symmetry – figure 2. Snowflakes are other model of radial symmetry – figure 3. Figures 4, 5 and 6 show spiral symmetry in nature – shell, sunflower, aloe vera. Figures 7 and 8 present translation symmetry in an agate and leafs.

Figure 1. Bilateral symmetry in nature [4]

Figure 2. Radial symmetry in nature

Figure 3. Radial symmetry in nature [5]

Figure 4. Spiral symmetry in nature

Figure 5. Spiral symmetry in nature [6]

Figure 6. Spiral symmetry in nature [7]

Figure 7. Translation symmetry in nature

Figure 8. Translation symmetry in nature [8]

Figure 9 presents a plant with an interesting symmetrical balance formed on the combination of perpendicular located symmetries in position of leafs. The symmetries can be considered as bilateral and radial. The perpendicular arrangement of the leafs makes amazing spatial rhythm. It is bilateral symmetry because it can be seen two the same form, which are mirror images, right and left ones. And it is radial symmetry too, because it can be considered as rotation of two leafs around a point.

Figure 10 presents a honeycomb. The honeycomb sells form hexagonal net, one of third equilateral grids – the triangular, quadratic and hexagonal nets. The triangular grid is translation symmetry in 3 directions, the quadratic net combine translation symmetry in 4 direction, and hexagonal ones – translation symmetry in 6 directions. The third equilateral grids can be considered as combination of radial symmetries too. These are excellent bases for pattern design of fabrics.

Figure 9. Interesting combination of symmetries, which can be considered as bilateral and radial [9]

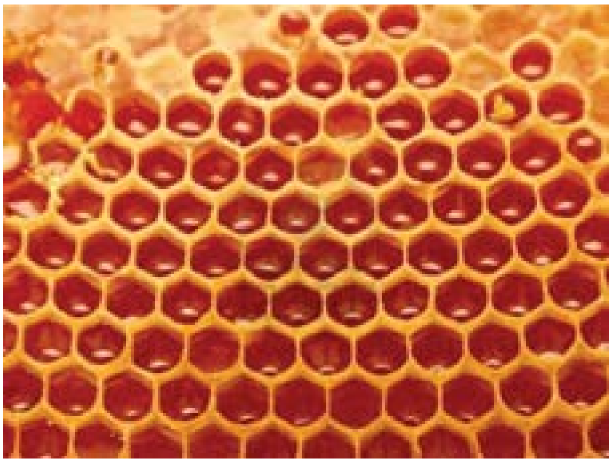


Figure 10. Hexagonal net – translation symmetry in six directions or combination of radial symmetries [10]

3. SYMMETRY IN COLLARS

For the study of the application of the types of symmetry in nature in fashion design a classic dress in tailored silhouette with knee length is drawn. The dress is a base for different models of dresses with variety of collars, designed with the use of different types of symmetry. The models are presented in figures 11-16.

The most popular type of symmetry in collars' design is bilateral or reflection one. And in forms of collars this type of symmetry can be combined with another type. For example, figures 11 and 12 present dresses with symmetrical collars with element, arranged in radial symmetry.

In the collar of the dress, shown in figure 11, the radial symmetry is applied in multiplication of the geometrical shape of the lapels, forming a radial rhythm (the rhythm is got after triple repeat in particular order).

Figure 12 presents a dress with form of collar with an application of the radial symmetry in 3D elements - radial situated pleats.

Figures 13 and 14 present application of spiral symmetry (a spiral element) in collars design. The spiral element is similar to the form of the shell, shown in figure 4.

The model, shown in figure 13, presents the use of the spiral symmetry as an element in an asymmetrical collar – an asymmetric balance of different right and left part of the collar on the base of bilateral symmetry. The composition principle of similarity is used in the forming of the sleeves in the length line with the use of the same spiral element which is applied in the collar.

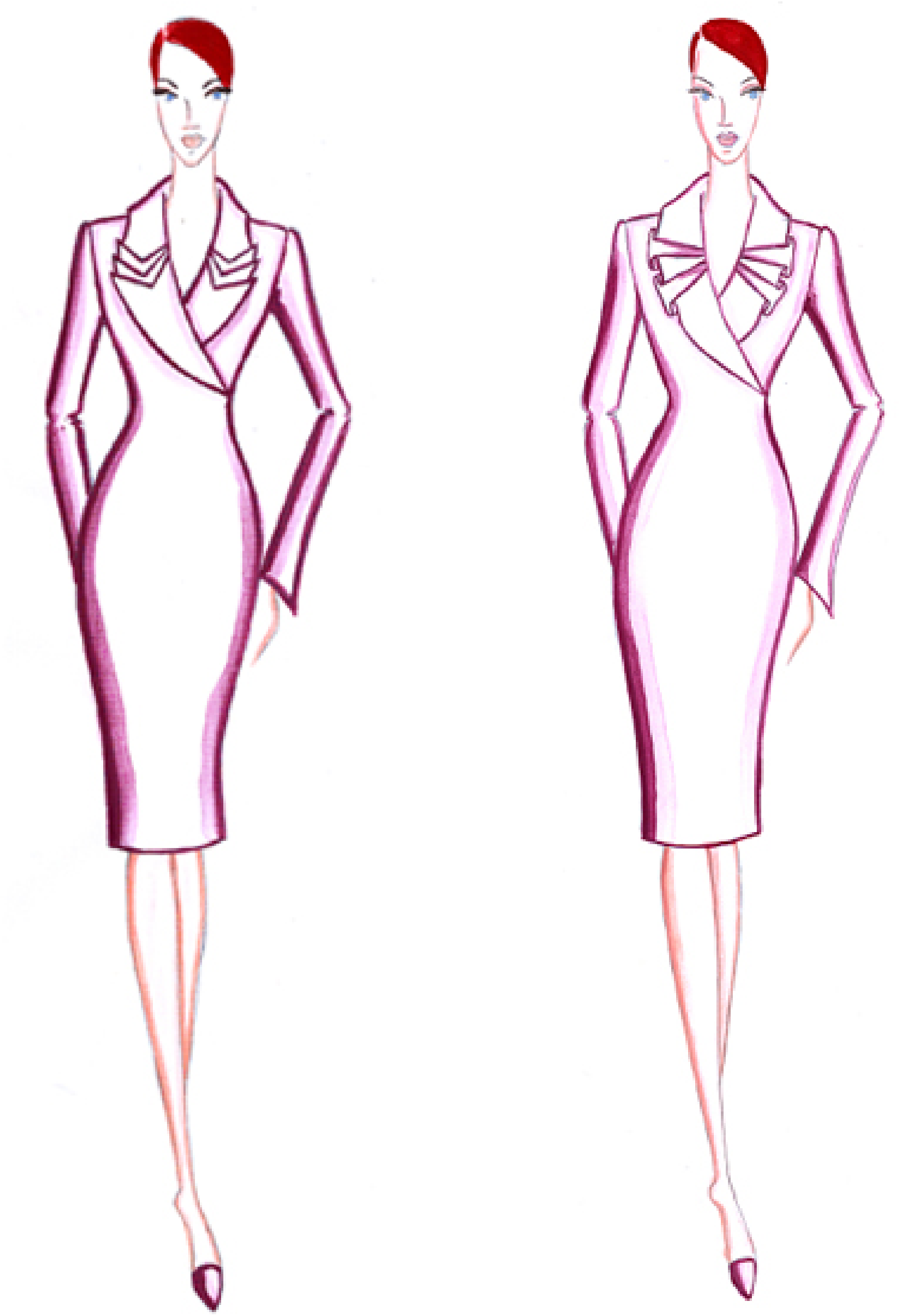
In the introduction it is mentioned that fashion composition can be structured in symmetrical or asymmetrical balance on the base of bilateral symmetry. But it can be added and third balance – symmetrical one with asymmetrical location (according to the reflection symmetry) of small elements or details. This type of balance in composition is presented in the design of the collar in figure 14. The collar is fully symmetrical (on the base of bilateral symmetry) on the first view, but the spiral element in the right and left parts are not reflection symmetrical. They are symmetrical, but according to translation symmetry, because they aren't mirror images, they are oriented on the one and the same direction. Therefore the collar of the dress, which is shown in figure 14, combined three types of symmetry – bilateral, spiral and translation symmetry.

The spiral symmetry in nature always is in proportions of Golden section or Fibonacci order. This regularity can be applied directly in proportions in fashion design.

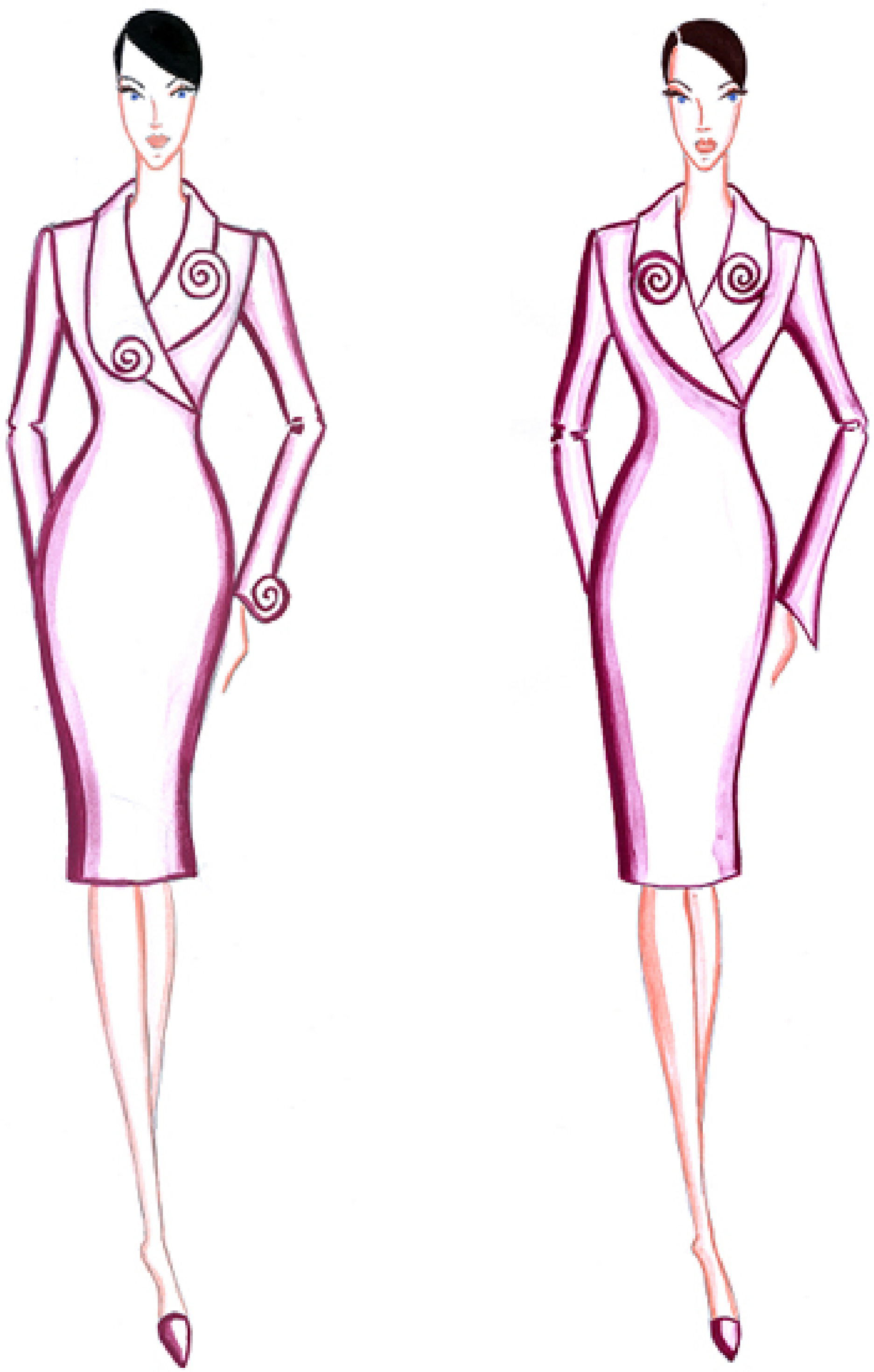
And in the final translation symmetry is seen. It is shown in the model in figure 14, but the spiral symmetry is the basic for the model design. The translation symmetry is basic in the design of the collars of dresses, shown in figures 15 and 16.

The design of the collar of the dress, presented in figure 15, is similar to the one, which is shown in figure 11. But in this case translation symmetry (similar to order of the lefts, presented in figure 8) is applied in multiplication of the geometrical shape of the lapels, forming a linear rhythm in vertical direction.

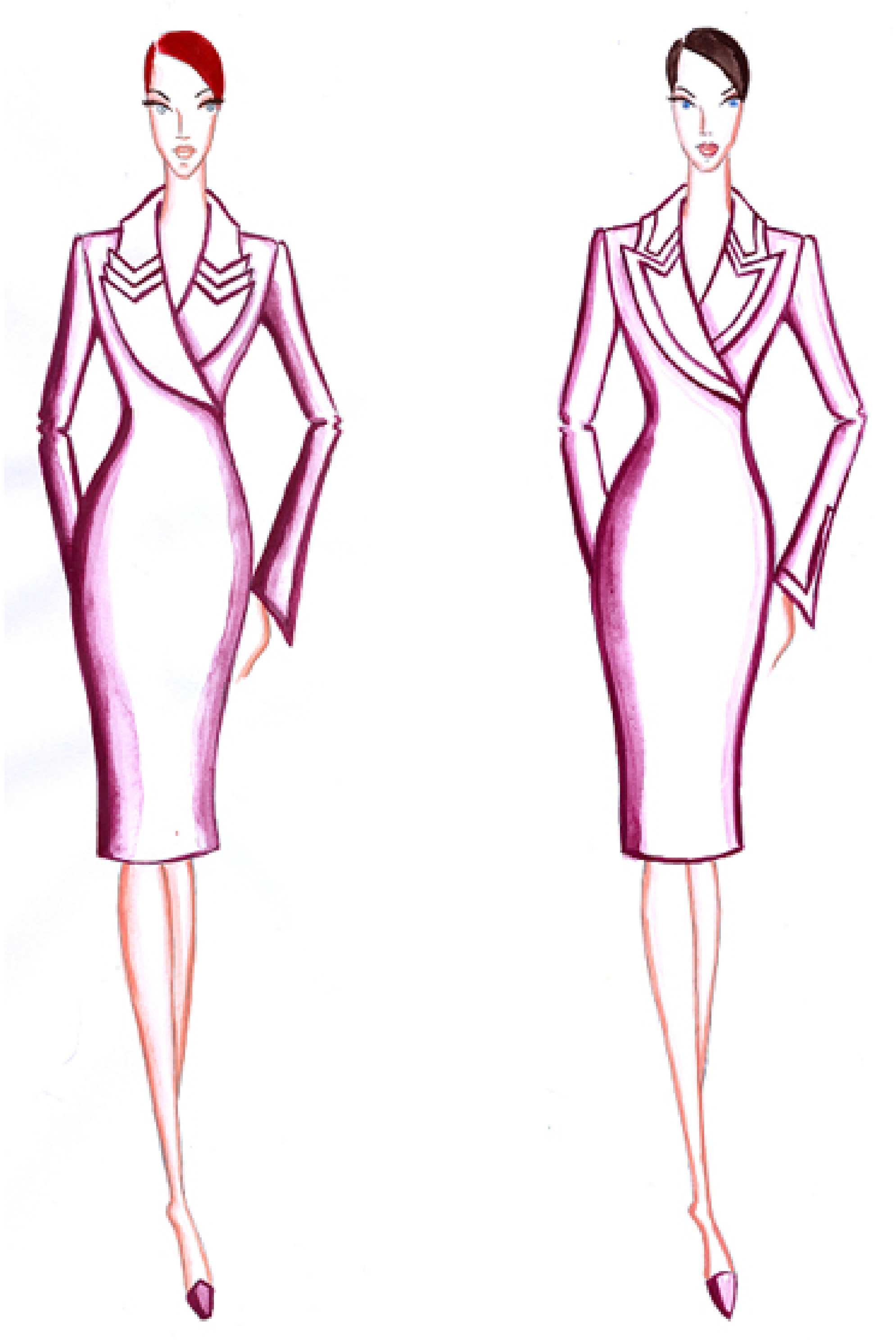
Figure 16 presents the application of translation symmetry in decorative lines in the lapels and collar. The decorative lines are parallel to the collar and lapels edges. The translation symmetry in this model is similar to the equidistant translation symmetry in the agate, shown in figure 7. Like the model, presented in figure 11, the composition principle of similarity is used in the forming of the sleeves in the length line with the use of decorative equidistant lines. Another similarity can be found in presented design and it is connected with the source of the idea – the agate in figure 7. This similarity is the color of the dress – magenta, which is the basic color of the agate.



Figures 11 and 12. Radial symmetry in collar design



Figures 13 and 14. Spiral symmetry in collar design



Figures 15 and 16. Translation symmetry in collar design

4. CONCLUSIONS

The application of the radial symmetry in fashion design brings motion or romantic side in the models, and it breaks up the uniformity and strictness of classic styles of garments. The spiral symmetry brings interesting and artistic note. And translation symmetry introduces elegance and finesse.

The symmetrical and asymmetrical balance in fashion composition with the use of every type of symmetry, which can be found in nature, and their combination with other principles of composition are very successful way for designing of attractive ladies' garments with definite purpose and character. That combination is found in the use of suitable geometrical form of lines and appropriate colors, according to their associations and the nature is a source of forms and color, and their harmonious combinations.

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