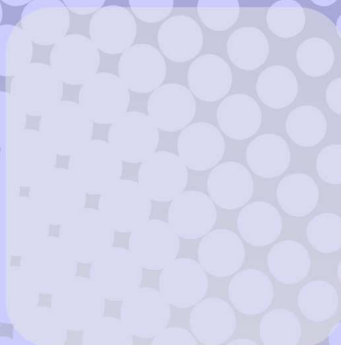


# DETUROPE



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## **EDITORIAL**

It is a pleasure for the Editor-in-Chief to introduce the third this year's issue of the online journal, which offers a possibility for the international community of professionals working in the fields of regional and rural development or tourism, to exchange their ideas and research results or practical achievements.

As seen from the previous issues, CEJRDT is an online journal with open access to the interested community of researchers and practitioners. The Editorial Board of the Journal is made up of Czech, Hungarian and Serbian members. The papers are published in English and German as the two main tools of international communication in the regions, but the journal intends to support national languages, allowing the publication of papers in Czech, Hungarian and Serbian languages – with English summaries. The strict review process coordinated by the three editorial boards and the joint scientific boards of the journal guarantees the quality and professional value of published papers. The papers can be read in the homepage of the journal, or downloaded as printable PDF files. Authors wishing to publish their results can also find the guidelines and contact addresses in the homepage.

According to the decision of the editorial board made in May 2010, we will publish at least three issues every year with at least six essays in each. For preserving the strict formal requirements from earlier and strengthening the institution of reviewing, we definitely insist on providing a correct English summary besides every paper written in Czech, Hungarian and Serbian.

The editorial board wishes to ensure the presentation of the articles in SCOPUS, which is one of the greatest and most important abstract and citation databases of peer-reviewed literature. Shortly we will also establish contacts with other databases for the same purpose.

In order to strengthen national languages, we strongly recommend the Czech, Hungarian and Serbian authors to attach a summary in their native language as well when they publish essays in English or German.

We hope that the authors and readers of our journal find it a challenging communication surface encouraging their creative powers to make it lively and popular in the near future.

The Editor-in-Chief

**A POSSIBLE APPROACH OF THE CONCEPT OF 'GLOCAL'  
THROUGH INNOVATION**

**A „GLOKAL” GONDOLAT EGYIK LEHETSÉGES  
MEGKÖZELÍTÉSE AZ INNOVÁCIÓ ÁLTAL**

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## **A POSSIBLE APPROACH OF THE CONCEPT OF 'GLOCAL' THROUGH INNOVATION**

### **A „GLOKAL” GONDOLAT EGYIK LEHETSÉGES MEGKÖZELÍTÉSE AZ INNOVÁCIÓ ÁLTAL**

**Key words:** innovation, local region, supply and demand, SMB, internal innovation system

#### **Abstract**

In this study, the authors examine the innovation performance and the internal and external factors that influence innovation in the local region of Zala County (NUTS3). The aim of the empirical research is to determine the performance of companies with the help of variables of the innovation systems and as a result the categorization of companies can be carried out. Further aims are to study the dynamics of the internal factors of innovation in a company and also to investigate the demand and supply. According to the research results, the innovation performance of small and medium sized businesses (SMBs - KKV) strongly depend on the innovation activities of four areas (product-, process-, organizational and marketing innovation) influenced by the internal innovation system of a company and the quality of various innovation services.

#### **Kulcsszavak:**

innováció, lokális térség, kereslet és kínálat, KKV, belső innovációs rendszer

#### **Kivonat**

A szerzők tanulmányukban vállalatok innovációs teljesítményét és az innovációt befolyásoló belső és külső tényezőket vizsgálják egy lokális térségben (NUTS3), Zala megyében. Az empirikus kutatás célja, hogy az újítási rendszer változóinak a segítségével meghatározza a cégek teljesítményét, mely segíti a vállalatok csoportokra bontását. További cél az innováció vállalaton belüli tényezői kapcsolati rendszerének a vizsgálata, illetve a keresleti és kínálati oldal feltárása. A kutatás eredményei rámutatnak arra, hogy a kis és középvállalkozások (KKV) innovációs teljesítményét kifejezi a négy területen (termék-, folyamat-, szervezeti- és marketing innováció) végzett újítási tevékenység, amelyet a vállalatok belső innovációs rendszere, illetve az innovációs szolgáltatások minősége befolyásol.

## **INTRODUCTION**

Innovation research has been a relatively new field of research within the science of management. Earlier it was considered by many a fashion-word – the inevitable component of scientific analyses in economics. Today, the world of academics, as well as pragmatics of economic policy agrees that the role of innovation is unquestionable. The capability for innovation is more and more becoming the tool of survival and future building.

In our present study we examine the innovation activities of companies located in Zala County in order to identify the local characteristics of innovation. Traditional national and regional studies are of vital importance since they provide the background for international studies. They also provide assistance to the comparison of research and development

activities, although these studies do not reveal much information on the problems and context of local issues. Consequently, we agree with (Pogátsa – Szívós, 2008) who suggest that the analysis of economic development and innovation trends must extend across the traditional NUTS2 regional borders and should additionally include county, small regional and city levels especially if the research focuses on the promotion of rural advancement. Out of the many Hungarian county approaches the research results of Inzelt – Szerb, (2003) have also inspired our study.

The role of SMBs is increasing in economic development because it employs 70 percent of those working in the for profit sector. In addition about half of the added value and the third of the total export of the national economy is created in that sector (Papanek, 2010).

It is especially important to investigate the innovation activities of SMBs in areas where the investments of multinational companies are not expected in the near future.

On the basis of economical indicators County Zala is a moderately developed region in Hungary; it is not well situated within the West Danubian Region. As a result it is paramount to find ways to drive its development at local, regional and country levels. During our research process - to assign possible ways of innovation - we examined the main participants of the innovation system at county level further focusing on the internal innovation activities of businesses through the relation between R+D and innovation and through the internal and external influencing factors of innovation. We also have taken their future inclinations on innovation into consideration. The supporting environment has also been analysed in details. This analysis included the comparison of the companies' inclinations and the offered services. In our present study the main findings of our research will be introduced.

## **THE THEORETICAL BACKGROUND OF THE RESEARCH**

More and more attention has been devoted to innovation in analyses on economic policy since it has been widely acknowledged that the sustainable competitiveness of both nations and regions largely depends on it.

Considering the fact that many definitions exist on innovation (Kotler, 2004; Lundvall, 1995; Drucker, 2003), the one adapted by the writers should be unravelled. We prefer one of the most quoted definitions by Schumpeter (1939) claiming that any form of achieving goals in an unusual way can be called innovation. The drive of capitalist development innovation and the source of innovation are business activities. Though Schumpeter's concept is

general it formed the base for the definition later used by the OECD which can be found in the most recent third edition Oslo Manual (2005, p. 30). It corresponds with the demands of the 21<sup>st</sup> century.

*'Innovation is the introduction of a new or considerably improved product (goods or services) or process, a new marketing technique or new organising-organisational method in business practices, working place or external relations.'*

While innovation is closely related to Research and Development (R+D) and the learning process it also exceeds them. R+D are a component of the innovation process and not necessarily the one that triggers a new concept or idea. Not all innovation processes include R+D activity; in fact it is often the case that R+D activities do not lead to innovation (Török, 2006). Innovation though, apart from the direct economic benefits has further advantages resulting from the learning process: accumulated company-specific knowledge that can lead to future innovation (Inzelt, 1998; Bajmócy, 2008).

The national innovation system (NIS) (Nelson, 1993) and the regional innovation system (RIS) (Cooke - Uranga 1998) differ based on territorial characteristics. There are major qualitative and quantitative differences between the national and regional/local systems. The regional, local aspects are in a sense neglected in the national system and the institutional system is also chaotic. The regional innovation system is able to capitalize on the locally created and readily available knowledge characteristic of the region (Gregersen – Johnson, 1996; Andersson – Karlsson, 2004). The innovation activities of businesses largely depend on the local factors. Innovation and creativity are embedded in local social relationships (Somogyi - Ricz, 2011). When defining the regional innovation models notions such as the milieu (the interactions and synergy systems between businesses, decision-makers, regional institutions – (Rechnitzer, 1998), clusters (the cooperation nets of numerous small and medium sized businesses – (Porter, 1999; Van den Berg - Braun - van Winden, 2001) are of major importance.

According to the theory of innovation systems all regional factors and participants are part of the innovation potential which determine, support or even hinder the rise and spread of innovation (Dóry, 2007). Hence, innovation is not only closely connected to universities or research institutions that have the necessary technological equipment and innovative mind but also workshops, various professional communities that generate knowledge and technological expertise (Dóry - Rechnitzer, 2000). Innovation services, several 'bridging' and transfer organisations as well as innovation agencies and business development



institutions (chamber, industrial parks) fulfil similar roles (Muller - Zenker, 2001). Innovation services can be drawn on through these institutions so we believe that the investigation of them is inevitable at county level.

The innovation potential of a given region can be influenced by the alteration of the microeconomic and site capacities of businesses. In order to do so the innovation performance of businesses must be measured. The internationally accepted standard of this measurement is the Oslo Manual. With the help of the Community Innovation Surveys – CIS questionnaire the innovation activity of businesses within the EU has been studied four times recently. This questionnaire formed the basis of the innovation studies (Innovation in the Western Danubian region 2006, 2007, 2008) carried out on the Hungarian regional business (SMB). To determine the innovation performance of the companies, firstly the general economic characteristics of the SMEs were measured, than the specific areas of innovation (product-, process-, organizational- and marketing innovation) were examined. Finally the survey was closed with the investigation of the influencing internal and external factors on the innovation activities. The measuring of the SMEs innovation performance was a very new approach, because in the past decades only the investigation of the large companies was usual. The results of these studies helped us to complete the measurement of innovation performance in Zala County.

## **OBJECTIVES AND METHODS**

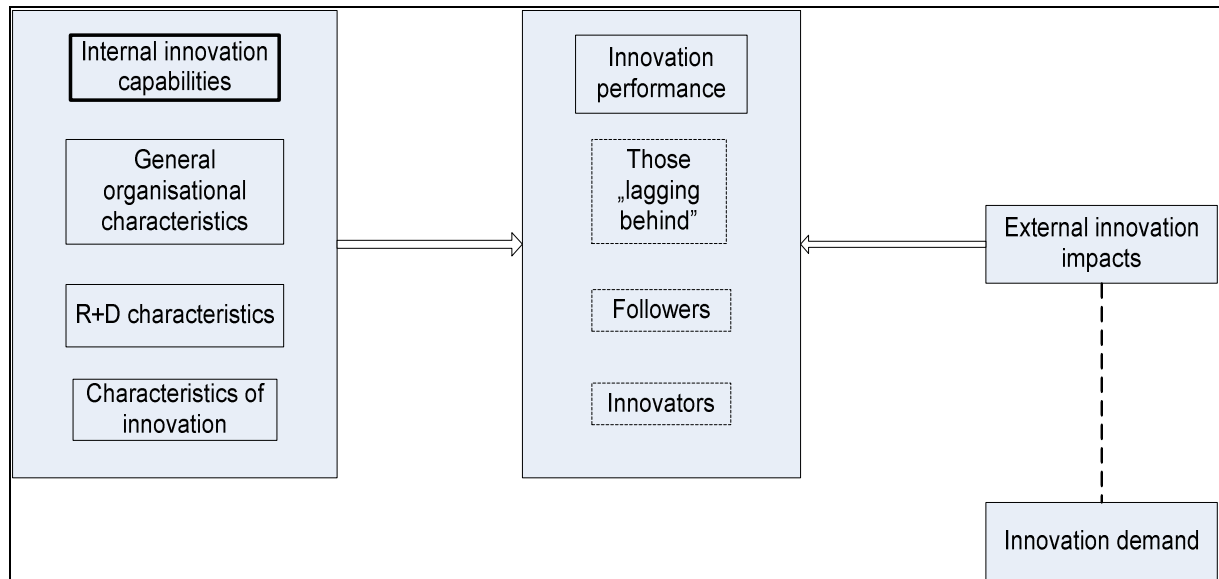
The aim of present study is to investigate the innovation performance of companies and the internal and external influencing factors of innovation. It was also considered to be important to carry out a comparison of the companies' inclinations to innovation and the offered services.

The central element of the research is the innovation performance of companies in Zala County. It can be detected by the variables of the innovation system (see earlier international CIS and the Hungarian Innovation in the Western Danubian Region 2006-2008). It had been assumed that SMBs could be divided into distinctive clusters or groups (those 'lagging behind', followers, innovators). We also believed that the relationship system of the internal factors (general organisational-, R+D and the characteristics of innovation) influence the innovation performance of companies. A correlation between the regional characteristics of innovation services (innovation supply) and the innovation performance of companies had been presumed as well. We supposed that those regions

where more and better quality services are available the results of innovation are more tangible (Figure 1).

In the course of our research we intended to look into the innovation needs of SMBs. Our hypothesis concerning the innovation needs has been that the demand indicated by companies and the available supply are not in proportion.

**Fig. 1** Research model



Source: own edition

In the course of the quantitative survey data was collected among small and medium sized businesses (SMB) in Zala County through questionnaires between October, 2008 and February, 2009. The questionnaire centred around the period of 2005 and 2007 and can be divided into three main areas. In the first part, some general information on the company are covered, in the second the R+D and the innovation activities are investigated and in the last part the questions regarded the terms and conditions of the realization of innovation, the characteristics of Zala County and the basic information on services.

Based on information collected from the official database of CSO (Hungarian Central Statistics Office) there were 2409 SMBs employing 5 or more workers in Zala County as of 1 January 2008 (that is adopting the survey results of earlier CSO stating that companies employing less than 5 workers have low inclination to innovation). 2409 companies had been posted the questionnaire, which were later collected. The total number of questionnaires turned in was 303 out of which 213 were full-scale and assessable. It gives us an almost 9 percent inclination to respond. The division of the companies based on their innovation activity had been carried out before the detailed analysis of the sample. This was

followed by the allocation of variables. There were 21 variables in total which indicated R+D and innovation and various parameters influencing the innovation activity (the most influential variables were those which denoted product-, process-, marketing and organisational innovation – see Oslo Manual (2005). After selecting the parameters the differing scales were standardised (Barna-Nagy-Molnár, 2007). Out of the possible analytic methods the K-MEANS clustering was chosen. In a research with small number of samples K-MEANS clustering can be used (Székelyi – Barna, 2005) but the number of clusters must be indicated ahead of the analysis. Only a very well founded reasoning may justify a cluster with low number of elements as a result we included a minimum of 10 elements in each all three clusters established. Only those companies remained in the sample that had valid information to explain all 21 variables.

The econometric study contained a cross-tabulation analysis to conceive information on the context of the internal innovation of companies and to show the connection between various tasks and to determine the strength of these connections (Molnár-Barna, 2004). In addition to the quantitative method, qualitative research method was applied as well by carrying out guided interviews. Among the innovation service providers in Zala County we completed 14 interviews between March and May of 2009. The interviews were organised around seven topics the first three of which focussed on the history, the operation and financial background of the companies. Topics also included the quality, consistency and motivations of their relationships with SMBs. Interviewees then were asked to choose from a set of definitions describing innovation. By asking about the ways innovation service providers help businesses in Zala County our purpose was to find out more about the quality of their innovation activities. There were also some questions on the already provided services and those planned for the future. Last, respondents were asked to evaluate the conditions of realizing innovations in Zala County and to list some factors that hinder innovation.

## **RESEARCH RESULTS**

### *Comparing clusters*

The 213 businesses have been divided into three groups (158-45-10) by clustering. The size of each group was considerably different meaning that group 1 contained 74% of the companies. It was assumed that the innovation performance of all three groups were significantly different in the three main areas the research focused on.

Based on the general organisational characteristics (Table 1) the first two groups – one including 158 companies and the other including 45 businesses – was not significantly different from each other. The main demonstratable difference was the strength of their relationships. The third group including 10 companies showed a more significant difference.

**Table 1** Main information regarding the company groups

	<b>158 companies</b>	<b>45 companies</b>	<b>10 companies</b>
<b>Number of employees</b>	23,54	29,22	372,44
<b>Net revenues (in million Ft)</b>	237,94	322,29	5410
<b>Percentage of foreign ownership (%)</b>	5,33	9,17	31,17
<b>Percentage of the group of companies' ownership (%)</b>	5,22	22,22	30

Source: own research

The part of the research that focuses on R+D (Table 2) further differentiated the sample and major differences could be found between the first two groups. The group including 45 businesses was much more developed in their innovation. Moreover, some variables showed major differences in case of some of the financially stable large company-groups as well.

**Table 2** Data of the company groups related to the R+D

	<b>158 companies</b>	<b>45 companies</b>	<b>10 companies</b>
<b>R+D spending in proportion to the yearly revenue</b>	0,73	3,31	3,35
<b>How many percent of the employees possess a degree?</b>	12,83	15,16	23,53
<b>How many percent of the employees work in R+D?</b>	0,24	5	0,66
<b>Percentage of those owning quality assurance</b>	35,04	55,55	100,00
<b>Invention, patent and publication 2005-2007</b>	2,1	7,40	6,70

Source: own research

In case of parameters describing product, process, organization and marketing innovation there is a huge dividing line between the group including 158 companies and the rest of the businesses. The difference is greater than in case of the R+D performance. In fact the innovation activity of the largest group (including 158 companies) is insignificant except for the product advertising compared to large companies (Table 3). Given their innovation

activities the Hungarian SMBs of 45 businesses are the most active except for two cases: introducing new products or new and more developed methods into the organisation.

**Table 3** Innovations realized by groups of companies

	<b>158 companies</b>	<b>45 companies</b>	<b>10 companies</b>
<b>Introducing new products</b>	15,18	35,60	40,00
<b>Introducing new services</b>	12,02	64,40	20,00
<b>Introducing new methods</b>	8,22	66,70	20,00
<b>New logistics and transportation methods</b>	3,79	51,10	0,00
<b>New activities</b>	6,33	66,70	50,00
<b>New or improved methods concerning the business practices</b>	5,06	66,70	50,00
<b>New or improved methods in the organization</b>	3,79	57,80	80,00
<b>New or improved methods to keep external relations</b>	9,49	71,10	60,00
<b>Product planning</b>	1,89	28,90	20,00
<b>Packaging</b>	1,89	31,10	0,00
<b>Product launch</b>	6,33	48,90	10,00
<b>Advertising products</b>	25,31	57,80	10,00
<b>Pricing</b>	5,06	66,70	0,00

Source: own research

Concerning the general organizational characteristics, the innovation, R+D capacity companies within the same group are significantly different. The first group including the most companies are those 'lagging behind'. They hardly deal with innovation and their inclination for innovation is low. But there is an improvement oriented group of mainly Hungarian owned small businesses – the followers – who are open for innovations in order to boost their competitiveness. The last group is called the innovators. They are companies of considerable capital and revenue and also are open for innovation and R+D.

*The characteristics of the internal innovation*

It was also considered important to look at the relationship between the general organizational characteristics influencing innovation and the R+D activity and the achievements driven by innovation. While the R+D indicators and the general characteristics were the independent variables, innovation activities (product-, process-, organizational and marketing innovation) became the dependent variables. As a method the

cross-tabulation analysis was applied because the metric scales necessary for the correlation and regression analysis were only available in the independent variables, whereas independent variables could not be placed in the metric scale. According to our assumption, there was a strong and easily detectable relationship between R+D and innovation in companies, but that could not be proven in the two other areas. The cross-tabulation analysis revealed the followings:

Diverse correspondence – both in their strength and nature - could be established between various R+D activities and innovation. Only in case of the proportion of employees working in the field of R+D, publications, patent and invention variables showed significant correspondence with all four innovation areas. Cramer’s V value that would have signified a strong correspondence did not occur. The strongest association was 0,293 which is still very weak.

The relationship between the general organisational characteristics and the innovation only indicated a weak association in the following categories: percentage of foreign ownership, and the three categories focusing on innovation (product-, process- and organizational innovation).

The relationship between the general organizational characteristics and the R+D activities are the most complex and at the same time the highest values were measured in that relationship (0.421; 0.403 – Table 4). A moderate relationship was established between the quality assurance and the revenue and the quality assurance and the number of employees. It was also validated by the values of the Chi-square distribution.

**Table 4** The rate of employment, the rate of degrees and the relationship between the rate of employment and the quality assurance

		Rate of degrees					Quality assurance		
		0%	1-10%	11-50%	above 51%	Total	No	Yes	Total
<b>Rate of employment</b>	0-5 people	40 63,5%	7 11,1%	10 15,8%	6 9,5%	<b>63</b>	52 82,5%	11 17,5%	<b>63</b>
	6-50 people	26 22,2%	49 41,9%	36 30,8%	6 5,1%	<b>117</b>	69 59,0%	48 41,0%	<b>117</b>
	51-250 people	1 3,7%	15 55,6%	11 40,7%	0 0,0%	<b>27</b>	8 29,6%	19 70,4%	<b>27</b>
	above 251 people	0 0,0%	2 33,3%	4 66,7%	0 0,0%	<b>6</b>	0 0,0%	6 100,0%	<b>6</b>
	Sum	67 31,5%	73 34,3%	61 28,6%	12 5,6%	<b>213</b>	129 60,6%	84 39,4%	<b>213</b>

**Table 4** - continue

<i>Pearson</i>	<b>67,428</b>	<b>34,595</b>
<i>Cramer V</i>	<b>0,281</b>	<b>0,403</b>
<i>Significance</i>	<b>0,000</b>	<b>0,000</b>

*Source: own research*

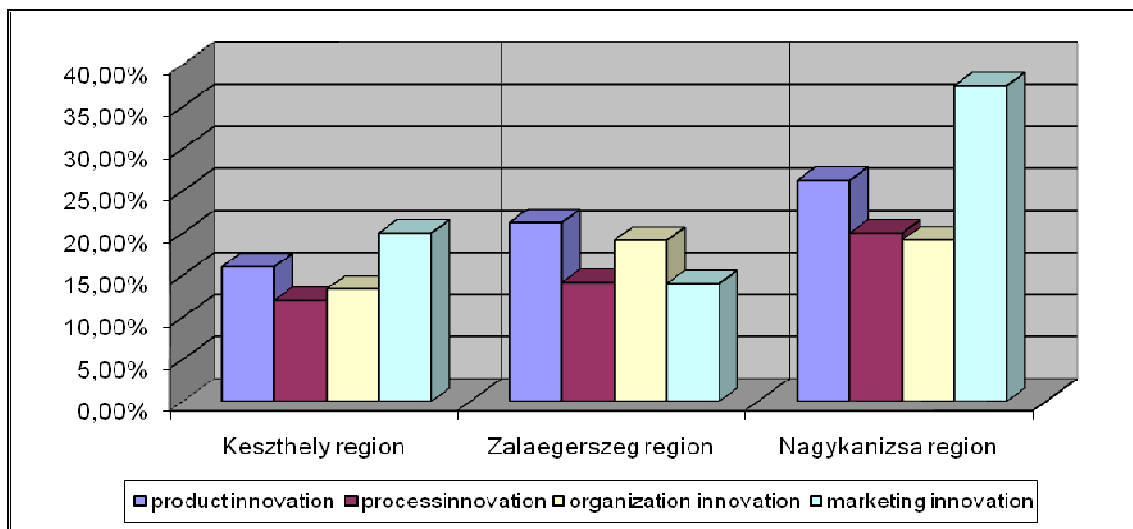
Based on the research it can be stated that our hypothesis could not be proved since we could not establish strong relationship between the R+D and the innovation. Our assumption that the general organizational characteristics and the innovation activities are not directly related could be established though. Finally, in the three categories we found the strongest association between the R+D variables and the general characteristics but even in there the relationship is only moderate.

*Categorical connections*

The process of mapping and selecting those appearing on the supply side revealed the followings: in Zala County there are two centers based on the innovation and R+D services. The first one is in Zalaegerszeg where many organizations and innovation experts can be found (innovation agencies, cluster centers, advanced industrial parks, business development foundations). The second centre concentrates around Keszthely where R+D are more advanced as a result of the existing agricultural research. We also analyzed whether the results of the innovation study carried out among SMBs reflect the bicentral nature of the supply side and whether there is a significant difference between the basic innovation activities of the small region businesses (LAU1).

The research result did not reflect our expectations. The reason behind this is that while the innovation service providers clearly centre around the two central regions of the county Zalaegerszeg and Keszthely, the innovation activities of the businesses do not reflect this. The total innovation performance of the businesses of Zalaegerszeg and Keszthely are close to equal. There are some minor differences though in some of the areas of innovation; in the county capital the processing industry is predominant as a consequence companies excel in product innovation there. In Keszthely companies achieve better results in marketing innovation possibly as a result of the more commercial nature of the district (Figure 2).

**Figure 2** The innovation achievements of companies operating in the small regions of Keszthely, Zalaegerszeg and Nagykanizsa



Source: own research

As the research evidence shows the innovation activities of Zala County are not influenced by the area characteristics of the supply side.

#### *Comparing supply and demand*

Finally, we aimed at providing a comparison of supply and demand (Table 5 - Annex). During the research on SMBs we asked companies (the complete sample of the study) what kind of services they would require in the future. This information formed one side and the other was the interviews made with the supply stakeholders covering 44 services. The results were summed up in a table. On the supply side those services which are included in the survey are marked with grey and the rest of the services help the general operation of businesses. Services required by companies and services offered by the supply stakeholders are not synchronized. It basically means that all traditional innovation services other than organizing technology fairs, market research and product development appear behind item 20 in our list of innovation service provision which indicates that only a few service provider offer them. Some of the services are not even offered by innovation service providers. Worst, product quality assessment as an innovation service is offered by two providers while there is a huge demand for it. To sum up the interviews the innovation service providers in Zala County offer rather general services supporting the operation of businesses. They lack an in-depth expertise in certain innovation services partly because there might not have been demand for those or maybe because the innovation service



providers are not aware of the needs of businesses. Our comparison has proved that there is a discord between supply and demand.

## **CONCLUSION AND THE APPLICATION OF RESEARCH RESULTS**

The focal point of our study was to examine the innovation activities of companies situated in Zala County, Hungary. Our aim was to detect factors influencing innovation, the correlations between demand, R+D, innovation and the general characteristics of companies. Furthermore, we studied the activities of innovation service providers, their future plans and their relationships with the local companies.

The innovation performance of SMBs is better signified by the innovation activities of the four defined areas (product-, process-, organizational and marketing innovation) which are influenced by the internal innovation capabilities, the characteristics of the areas of innovation and the quality of innovation services. Out of the previously mentioned factors the difference between the demand and supply of available innovation services should be emphasised. That difference causes potential bottlenecks in the effectiveness of service capacity, and puts limit on cooperation between organizations.

It is important to notice at this point that present study was the first in Zala County that involved so many areas and participants in the field of innovation. Our results can contribute to the improvement of the innovation performance of the county. The foremost practical step would be to inform service providers of our research results so that the demands of companies could be revealed to them. In addition, institutions of higher education and companies should be encouraged for cooperation in the future and the existing bridging organizations should be offered advised on their lack of knowledge on the existing research and higher education capacities. The possibility of targeted developments can be built on the group division established in our study: ‘innovators’, ‘followers’ and the unraveling and satisfying of their needs which eventually could lead to a more developed innovation in Zala County.

### **Summary**

The authors have studied the innovation potential of enterprises and the internal and external factors influencing innovation in a local region (NUTS 3), in one of the Hungarian counties. Traditional national surveys are important due to international studies and they also contribute to comparing research and development activities. However, they do not point out local innovation queries, problems or connections to an adequate extent. With regard to the research, among the few Hungarian and international examples those county (NUTS 3) and regional (NUTS 2) results were significant that helped the achievement of regional approach and those that studied innovation potential from the enterprise’s point of view.

It is worth highlighting two definitions among the various ones related to innovation since these would help to understand the direction of the research. The first one, which is quoted most frequently, is from Schumpeter who said that innovation is the ability to do things differently. This definition contributes to the broadening of the innovative processes connected to enterprises in the local regions; therefore, it helps to adapt the approach that expresses that innovation is not equal to inventions. The other definition puts 'doing-things-differently' into categories; accordingly, these activities can be classified as improved product, process or marketing method or new organizational method in the business practice with respect to SMEs.

One aim of the empirical research is to describe enterprise types/groups by studying the variables of the innovation system. The studied 213 enterprises can be classified into groups with the help of cluster analysis. It can be presumed that the performance of the groups would differ significantly in the three studied fields influencing innovation.

Another goal is to present the relationship system of innovation factors within a company; therefore, it is essential to look into what relations can be revealed between the general organizational characteristics, R+D activities and innovative activities that play some role in the innovation of enterprises. It seems likely that there is a strong relation between research and development activities and innovative measures.

Furthermore, regional connections can be studied. The geographical location of the services of the supply-side and the innovative performance of companies can be compared. It is expected to find SMEs performing better in innovation where there are a lot of innovative service providers.

To study the demand-side of companies can also be interesting; namely, what is needed in the field of innovation; moreover, it is worth comparing those needs with the opportunities service providers in the same field offer.

The empirical study partly proved the above assumptions.

Based on general organizational characteristics, innovation and R+D activities the enterprises in different cluster groups differ significantly. The first group, which includes the largest number of enterprises, is the one that lags behind, the laggards - these companies lack R+D activities and innovation willingness. There is a circle of enterprises that are development and innovation-oriented and mainly owned by Hungarian entities that have been present in the market for a long time – the early adopters, who are open to innovation in order to improve their competitiveness. Finally, the group of large companies that in addition to significant profit and solid capital are interested in R+D and are also remarkable in innovation – they are the innovators.

The findings have not proved that there is a strong relation between R+D and innovation activities. The assumption also proved to be right that there is no strong connection between general organizational characteristics and innovation activities. Eventually, in case of the three studied field the strongest and most complex connection was between R+D variables and general characteristics although the connection between variables is maximum of medium intensity.

Based on the results, it can be concluded that the regional characteristics of the supply-side do not influence the innovation activities of the enterprises in county Zala.

The local R+D and innovation service providers are organizations that would rather help in general management of the enterprise and have not yet got involved in the various fields of innovation (there have been no serious demand for it yet presumably) and they may not know the exact needs of the enterprises, either. Based on the comparison, it can be concluded that there is no agreement between the supply-side and the demand-side.

### **Summary in Hungarian**

A szerzők tanulmányukban vállalatok innovációs teljesítményét és az innovációt befolyásoló belső és külső tényezőket vizsgálják egy lokális térségben (NUTS 3), Magyarország egyik megyéjében. A hagyományos országos vizsgálatok a nemzetközi mérések miatt fontosak, illetve jellemzően a kutatás-fejlesztési tevékenységek összehasonlítását segítik. Azonban a lokális innovációs kérdésekre, problémákra, összefüggésekre nem világítanak rá kellő mértékben. A kutatás szempontjából a területi megközelítés néhány magyar és nemzetközi példája közül azok a megyei (NUTS 3) és régiós (NUTS 2) eredmények voltak meghatározóak, melyek segítették a területi szemlélet kiteljesítését, illetve vállalati szempontból vizsgálták az újítási képességeket.

A számtalan innovációra vonatkozó definíció közül kettőt külön érdemes kiemelni, hiszen ezek segítik a kutatás irányának a megértését. Az első, a legtöbbet idézett meghatározás Schumpetertől származik, aki szerint

a gazdasági életben a dolgok másképpen való csinálásának bármely formája az innováció fogalmába tartozik. Ez a definíció segíti a lokális térségekben zajló, vállalatokhoz köthető újítási folyamatok kiszélesítését, így segíti elfogadni azt a nézetet, mely szerint nem csak a találmányok jelenthetnek innovációt. A másik meghatározás kategorizálja a „másképp csinálást”, eszerint termék-, folyamat-, szervezeti- és marketing innovációra bonthatóak ezek a tevékenységek a KKV-k esetében.

Az empirikus kutatás egyik célja, hogy az újítási rendszer változóinak a vizsgálatával vállalati csoportokat/típusokat írjon le. A vizsgált 213 vállalkozás klaszterelemzés segítségével bontható csoportokra. Feltételezhető, hogy a csoportok teljesítménye az innovációt befolyásoló három vizsgált területen jelentősen eltér egymástól.

További cél az innováció vállalaton belüli tényezői kapcsolati rendszerének a bemutatása, ezért fontos azt is megvizsgálni, hogy milyen összefüggés mutatható ki a vállalkozások innovációban szerepet játszó általános szervezeti jellemzői, K+F aktivitás és az innovációs tevékenységek között. Valószínűsíthető, hogy a kutatás-fejlesztéssel összefüggő tevékenységek és az újítási lépések között erős a kapcsolat.

Területi összefüggések is vizsgálhatók. A kínálati oldalon található szolgáltatások földrajzi elhelyezkedése és a vállalkozások innovációs teljesítménye összevethető. Elvárható, hogy ahol sok innovációs szolgáltató tevékenykedik, azokon a helyeken a KKV-k is jobbak az innovációban.

Érdekes a vállalatok keresleti oldalának a felmérése is, azaz mire van szükségük az újítás területén, illetve ezt az igényt érdemes összehasonlítani a területen működő szolgáltatók által kínált lehetőségekkel.

Az empirikus kutatás részben igazolta a fenti feltevéseket.

Az általános szervezeti jellemzők, az innovációs és a K+F magatartás, képesség alapján a klasztercsoportokba tartozó vállalkozások markánsan eltérnek egymástól. Az első, a legtöbb céget magába foglaló csoport a lemaradók, akiknek elenyésző a K+F aktivitásuk és ennél is jelentéktelenebb az innovációs hajlandóságuk. Létezik egy fejlesztés és újítás orientált, vagy legalább sikeresen adaptáló, zömében hazai tulajdonú, a piacon régóta jelenlévő kisvállalkozói réteg – a követők -, akik inkább saját erőből, a versenyképességük javítása érdekében nyitottak az újításra. Végül jól kimutatható egy jelentős árbevételű, tőkeerős, a K+F iránt erősebben érdeklődő, de az innováció szempontjából is meghatározó nagyvállalati csoport, ők az innovátorok.

Az eredmények nem igazolták, hogy a K+F tevékenységek és az innovációs tevékenységek között szoros kapcsolat mutatható ki. Az a feltételezés helyesnek bizonyult, hogy az általános szervezeti jellemzők és az innovációs tevékenységek között sincs szoros összefüggés. Végül a három terület esetében a legerősebb, legösszetettebb kapcsolat a K+F változók és az általános jellemzők között mutatható ki, de ebben az esetben is maximum közepes erősségű a változók közötti kapcsolat.

Az eredmények alapján megállapítható, hogy Zala megye vállalkozásainak innovációs tevékenységét nem befolyásolják a kínálati oldal szereplőinek területi jellemzői.

A megyei K+F- és innovációs szolgáltatók inkább általános vállalkozási működést segítő szervezetek, az újítás területein nem mélyedtek el (valószínűleg eddig komoly igény sem jelentkezett), talán a vállalkozások igényeit sem ismerik pontosan. Az összehasonlítás alapján kijelenthető, hogy nincs harmónia a keresleti és kínálati oldal között.

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## APPENDIX 1.

**Table 5** Comparing supply and demand

Demand of services			Supply of services	
Characteristics	%		Characteristics	%
market research	41,78%	1	preparing tenders	71,43%
technology fairs, organizing brainstorming	35,21%	2	providing inform. on a regular basis	71,42%
technological development	34,74%	3	organizing programs for educ. purposes	64,28%
product qualification	28,63%	4	organizing technology fairs	64,28%
economic verification of technologies	28,17%	5	participation in innovation research	57,14%
introducing valuable patent ideas	27,69%	6	making business plans	57,14%
product inspection	25,35%	7	financial and tax consultation	57,14%
technological positioning	25,35%	8	cut-rate loan for financing current assets	50,00%
revealing options for technical cooperation	23,47%	9	marketing and communication	50,00%
scouting	22,06%	10	partner mediation	50,00%
first sample inspections	21,59%	11	market research	42,86%
following techn. trends, reporting on trends	21,59%	12	Accounting advice	42,86%
assuring special machinery	21,12%	13	product development services	42,86%
patent and intellectual property	20,19%	14	Mentoring	35,71%
carrying out special lab tests	20,18%	15	investment advice	35,71%
involving risk-based capital	19,72%	16	Organizing economic networks	28,60%
production planning and preparation	18,78%	17	assuring offices and workshops	28,60%
calibrating measuring and verifying tools	18,78%	18	legal advice	28,60%
product development services	18,78%	19	revealing possible technical opportunities	28,60%
involving business angels	16,43%	20	support similar to tenders	28,60%
lending measuring and verifying tools	16,43%	21	technological positioning	28,60%
		22	patent and intellectual property	21,40%
		23	calibrating measuring and verifying tools	21,40%
		24	carrying out special lab tests	21,40%
		25	technology development	21,40%
		26	product inspection	21,40%
		27	introducing valuable patent ideas	21,40%
		28	product qualification	14,28%

**Table 5** - continue

Demand of services		Supply of services	
Characteristics	%	Characteristics	%
		29 involving risk-based capital	14,28%
		30 first sample inspections	7,10%
		31 production planning and preparation	7,10%
		32 deliver IT technologies	7,10%
		33 lending measuring and verifying tools	7,10%
		34 scouting	7,10%
		35 assuring the use of special machinery	7,10%
		36 following techn. trends, reporting on trends	7,10%
		37 economic verification of technologies	7,10%
		38 operational services	7,10%
		39 factoring	0,00%
		40 access to guarantee funds	0,00%
		41 leasing opportunity	0,00%
		42 hiring labour	0,00%
		43 secretarial services	0,00%
		44 involving business angels	0,00%

## **HOW TO OFFER THEORETICAL SOLUTION FOR PRACTICAL ORGANIZATIONAL PROBLEMS – CASE STUDY**

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## **HOW TO OFFER THEORETICAL SOLUTION FOR PRACTICAL ORGANIZATIONAL PROBLEMS – CASE STUDY**

### **Key words:**

Organizational theory, organizational diagnosis, Contingency theory, Life cycle of organizations,

### **Abstract:**

Establishing an organization, setting it on track of development is becoming a more and more complicated task and in most cases, requires expert knowledge. Scientific organizational theory offers a great variety of applicable methods and tools for small and young enterprises as support for their design and development. The performed case study is based on consultancy work at local Business Incubator in Subotica.

This article presents the author's approach, examination and description of some of the most common problems of small enterprises. A number of organizational theoretical terms were considered and have been connected with the specific case. The basic aim of the project was to solve a set of actual organizational problems for one of the business incubator tenants. The analyzed group of problems were related to the structural design of an organization (e.g. existing simple structure vs. functional), division of labor, job design, decentralization, delegation, formalization and standardization, and span of control.

The applied methods were based on classical organization theory, contingency theory, Adizes life cycle of organizations, and other different partial approaches. Far from the full set of factors that an up-to-date contingency survey uses, this article considers only a few aspects with special focus on small enterprises and their typical symptoms. While the task was successfully completed, it seems this combined approach lends proof to the problem solving possibilities of such methodical approach of applying organizational theoretical knowledge in practice.

## **INTRODUCTION**

Organizational problem solving possibilities are widely discussed in literature on management and organization. Usually problems are mentioned as subjects of change activities (such as major or main organization tasks and accessory tasks). Of course these problems or tasks for organizations are not the same. There are generally highly analyzable and lowly analyzable tasks. The classification of these tasks is case sensitive and very often depends on the theoretical background of the engaged experts. Usually, low analyzability tasks are difficult to solve and require the problem solvers to use judgment, instinct, intuition, and experience rather than programmed solutions. Some counterproductive norms can focus the decision-maker's attention on the simple issues, often the things one can measure quantitatively rather than the crucial issues – frequently these are the blockages to change and improvement (Hodge, 2003). At any rate, it is advisable to use or consider more theoretical approaches and techniques meantime to solve the practical problems. The lack of a clear and holistic viewpoint can cause blindness toward the problems of organization (Kieser, 1995). Thus it is advisable to use wider argumentation for the basic terms of organization. While classical management theorists such as Taylor and Fayol were looking



for the single best way in management and organization design, in the late 50s and early 60s a shift of paradigm arose, claiming that the organizational structure of a company or administration has to fit to the situation in which it finds itself. In today's variable situations the different structures turn out to be most effective. In other words the optimal organizational structure is contingent, depending on certain contextual factors. Therefore the Contingency Approach is included in the practical case study. Different researchers used to focus on different contextual factors and measure their influence in empirical studies.

Considering the basic organizational properties and contingencies in addition with other attributes according to the organizational science glossary one can offer as a useable approach to problem analyzing. Organization theory is a diverse field and involves 'pluralism' (Reed & Hughes, 1992) or 'paradigm war' (McKelvey, 1997) depending on the perspective. As a theoretical background of this article some other empirically-oriented contingency theory was added such as Burton & Obel's approach (Burton & Obel, 1998, 2005). They justify the adoption of this theoretical foundation on the basis that it has been developed sufficiently to provide a comprehensive set of internally consistent propositions or rules. "The contingency or situational approach recognizes that organizational systems are inter-related with their environment and that different environments require different organizational relationships for the effective working of the organization" (<http://www.fao.org/docrep/W7503E/w7503e03.htm>)

While the contingency approach was used to analyze contingency design fit solutions and organizational properties, the included Adizes Life Cycle Assessment approach was applied to make the case more comprehensive.

Whether in an external or internal consulting role, the participation of the client in all phases of the improvement process is a key factor to success. In respect of this role, the methodology was based on interviews and applied questionnaires according to the program OrgCon<sup>1</sup> (Burton, Obel, 1998), Step by Step Approach (Burton, De Sanctis & Obel, 2006) and Adizes on line Life Cycle Assessment<sup>2</sup>. (Adizes, 2010 a,b,)

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<sup>1</sup> The program "OrgCon" based on contingency approach expert system (Burton, Obel, 1998) provides a tool for diagnosis and design. It aids the design process by asking the designer questions about the current organization, the contingency factors, and then offers recommendations on the design, the configuration and the properties. (Zhiang Lin, 2011.)

<sup>2</sup> The Adizes Lifecycle Assessment Survey instantly produce and present a customized web report that contains a graphical representation and written summary of the lifecycle stage(s) of analysed company. The custom report is based on clients answers to a series of questions ([www.Adizes.com](http://www.Adizes.com))

## **MATERIALS AND METHODS**

Complex organizational problems are made simpler when they are separated into smaller, more understandable elements. That is why this shortened case study is based on the consideration of the crucial theoretical organizational terms. The selection of the right analysis tool depends on the nature of the problem. The list of cited terms guided the author to analyze and describe some of the most typical problems of small and young enterprises. The article describes one of the consultancy works completed in Business Incubator in Subotica. The basic aim was to solve the obvious and very typical problems of one of the small and young enterprises. Its case could be described as representative for the majority of firms in high rate of growth without named and delegated functions, lacking formal structure and formalization. According to the results of the initial enquiry (interview with the owner manager), this client - after a short period of being in the “Go-Go phase” it derailed towards the phase called “The founder’s trap” (Adizes, 2010a). The consultancy work started with the questions (basic terms) about the range of contingency factors including:

- Size/Ownership
- Management Style
- Organizational Climate
- Environment
- Technology
- Strategy.

And about the organization and its current situation are listed “organizational properties and structural configurations” (Burton, Obel, 1998) e.g.

- Organization's current configuration (organizational structure – form),
- Complexity (vertical, horizontal, spacial differentiation),
- Centralization and decentralization
- Formalization,
- Incentives, ...

As a matter of fact it is the problem finding stage that can be called the strategic assessment. The problem finding and problem formulation stages are also part of the

organizational audit. Special emphasis was laid on problems or typical symptoms that may occur in any of the small enterprises.

One of the possible patterns for analyzing these terms can be followed according to organizational (diagnosis and) design using a “Step by Step approach” (Burton, De Sanctis, Obel, 2006).

We “should start by assessing two, always existing, fundamental goals, efficiency and effectiveness. Efficiency is a primary focus on inputs, use of resources, and costs. Effectiveness is a focus more on outputs, products or services and revenues. These are competing priorities. Some organizations place a higher priority on efficiency, focusing on minimizing the costs of producing goods or services. Other organizations emphasize effectiveness focusing on generating revenues or seizing leading-edge innovation in the marketplace.” (Burton, De Sanctis, Obel, 2006)

Based on the given answers and interviews the current organization’s features could be summarized according to the highlighted terms. Meantime we can consider some theoretical recommendations pertinent to the current case).

## **RESULTS**

### **The strategy of the organization**

Before starting to analyze structural questions, one should know about the famous dictum “structure follows strategy” (Chandler, 1962). One of the simple but powerful ways to describe a firm’s strategy is in terms of reactor, defender, prospector and analyzer with and without innovation. (Miles & Snow, 1978) Situational contingencies influence the strategies, structures, and processes. There is always more than one way to reach a goal but in any case managers should adapt their organizations to the situation. Most likely the client’s (studied case) strategy is a defender because it has greater focus on exploitation than on exploration. That means defender is high on exploiting its resources and situation but low on exploring anything new or being innovative. The defender should maintain its position by being efficient much more than the competitors. The defender is slow to make significant change. This can lead to a dangerous position in some environmental circumstances. An organization with a defender strategy is an organization with a narrow product market domain. Top managers in this type of organization are experts in their organization's limited area of operation but do not tend to search outside their domains for new opportunities. In an uncertain environment, it is very likely that the customers will prefer variation in

products and services. Competitors are likely to vary their strategies in products, prices, advertising, etc. New innovative strategies may be called for.

Usually an organization in the “Go-Go phase is a company that has a successful product or service, rapidly growing sales and strong cash flow”.

([http://www.adizes.com/corporate\\_lifecycle\\_gogo.html](http://www.adizes.com/corporate_lifecycle_gogo.html))

The Go-Go companies are sales and opportunity-driven rather than opportunity-driving. They react rather than proact to opportunities.

Everything is described as a business priority. To make matters worse, often the overloaded manager has difficulty articulating his strategy and ideas clearly. (In the client's firm evidently bad sign predicting misfits). The employees who can interpret the Founder's ideas become the key person, critically important insiders. They may become trusted and authorized confidants in future.

### **The business environment**

Open systems theory can be defined as a theory of organization that views organizations dependable from their surroundings, highly complex entities facing considerable uncertainties in their operations and constantly interacting with their environment. The environment creates limits and opportunities for a firm's strategy and structure with other organizational properties. This system also assumes that organizational components will seek equilibrium among the forces pressing on them and their own responses to their forces. The organization's environment can be described in numerous ways. For this case the four dimensional environmental description will do. A) The environmental complexity which is the number of factors in the environment, and their interdependency. B) The environmental uncertainty which is the variance among the factors. C) The environmental equivocality which is the ignorance and confusion about the existence of some factors. D) The environmental hostility which is the extent of malicious external threats.

In the examined period of time the client's business environment can be described as a medium equivocality, medium uncertainty, and high complexity. In this stage it is important to consider: does the strategy fit the firm's goals. If it does not fit the goal, the statement should be reconsidered or the strategy to fit with the goals. Second: does the strategy fit the environment? Generally the aim (in the case of such a small firm) is to move the organization's strategy to fit the environment.

### **The size of the organization**

One of the most widely accepted measures for organizational size is the total number of full-time or full-time-equivalent employees. With the 12 employees the consulted firm can be considered as a small enterprise. Some approaches define the adjusted size e.g. define correction factors according to the employee's level of education. Between 51 and 75% of the people employed by the client have a high level of education. But in this case the possible adjustments do not mean change. This enterprise is a typical small privately owned firm (a bit over the size of the so-called micro firm).

### **Organizational structure**

It is sometimes called configuration or architecture, frequently pictured as an organizational chart. It shows the principles of departmentalization identifies the grouping together of functions or individuals, hierarchy - number of levels and the span of control, formal communication patterns - coordination, and integration. A poorly designed structure may cause a number of misfits between the organizational properties and contingency factors. The contingency theory of organizations posits that there is no single best way to organize. The optimum structure for an organization depends on the values of variables describing its task and environment. The organizational structure must provide adequate support for the position and effectively. That means sufficient authority, resources and management support. All of the job overlaps should be avoided as a source of inefficiency and conflicts.

According to the scheme – organizational chart given, it was easy to recognize that the client's organization had a typical Simple Structure. That can be characterized as a structure with low degree of departmentalization and a wide span of control. The authority is largely centralized in a single person with very little formalization. It usually has only two or three vertical levels, so it could be called 'flat structure', and means low vertical differentiation. Human resources are a flexible set of employees, and generally one person in whom the power of decision-making is invested. This simple structure is most widely practiced in small business settings where the manager and (usually the) owner happens to be the same person. Its advantage lies in its simplicity. This makes it responsive, fast, accountable and easy to maintain. However, it becomes grossly inadequate as and when the organization grows in size. Such a simple structure is becoming popular because of its flexibility, responsiveness and high degree of adaptability to change. Go-Gos need continuous restructuring. They are like children who keep outgrowing their clothes. Many Go-Go

leaders however attribute little importance to structure, managerial processes or systems. They are focused externally on the sales. Organizational structures, roles, responsibilities, require attention to detail, discipline and self-restraint. These qualities are quite alien to the entrepreneur”. ([http://www.adizes.com/corporate\\_lifecycle\\_gogo.html](http://www.adizes.com/corporate_lifecycle_gogo.html))

### **Question of organizational complexity**

The complexity of organization is measured by vertical (hierarchical), horizontal, and spatial (geographical) differentiation. In most of the cases an organization’s hierarchy (vertical differentiation) begins to emerge when the organization experiences problems (very often connected with the question of delegation). A basic design challenge involves deciding how much authority to centralize at the top of an organization and how much to decentralize to middle and lower levels.

Small organizations should have low organizational complexity. The client has a routine technology, which implies that the organizational complexity should be low. When the environmental hostility is high, organizational complexity should be low. The top manager has a preference for a high level of involvement into decision making in lower (operative) level, which leads to lower organizational complexity. It is also a symptom that appears in the Go-Go’s founder trap.

”When the size of the company and the environmental complexity increases, the top of the simple structure usually may get overloaded with information”. This information overload may compromise the effectiveness of the decision-making performed at the organizational top, and make the organization slower in its adaptation to new situations. Growing companies, in changing and dynamic environments, may therefore need to specialize and formalize its organizational structure, so that work must not be as heavily coordinated by the organizational top. Likewise, companies may need to differentiate activities into subtasks, and employ specialists responsible for a given subtask previously handled by e.g. the company owner. Finally, companies may need to decentralize some of the decision-making power to lower levels of the organization, so that decisions are made by people responsible for the subtask, and who controls specific knowledge and information about the handling of the given subtask. A clear pattern of vertical and horizontal differentiation can cut down on role conflict and role ambiguity”. (<http://www.businessmate.org/Article.php?ArtikelId=183>)

”Organizational differentiation means the un-bundling and re-arranging of activities. Re-grouping and re-linking them is organizational integration (Lawrence & Lorsch, 1967).

When different units are assigned individual tasks and functions, they set independent goals” also. (<http://www.fao.org/docrep/W7503E/w7503e03.htm>)

### **Organizational climate**

Organizational climate is a measure of internal environment and can be described in terms of the values of a particular set of characteristics or attitudes of the organization. It is experienced by its members. It refers to all members of the organization including superiors and subordinates. Basically the climate can be described with two dimensions: A) Tension - incorporates a combination of organizational factors as experienced by insiders such as trust, conflict, morale, rewards, leader credibility and scapegoating. B) Readiness to change – people’s readiness to shift direction or adjust their work habits. For more precise diagnosis the four category models as a combination of the mentioned dimensions seems to be applicable. (Table 1.)

**Table 1** Organizational climate dimensions

	<b>Group</b>	<b>Internal process</b>	<b>Developmental</b>	<b>Rational goal</b>
<b>Tension</b>	Low	High	Low	High
<b>Readiness to change</b>	Low	Low	High	High
<b>oriented</b>	Internally	Internally	Externally	Externally

Abridged from: Burton M.R. DeSanctis G., & Obel B. (2006) p. 149.

Based on the answers provided for analyses, it is most likely that the client’s organizational climate is a developmental climate. ”The developmental climate is characterized as a dynamic, entrepreneurial and creative place to work. The leaders are considered to be innovators and risk takers. Readiness for change and meeting new challenges are important. The organization's long-term emphasis is on growth and acquiring new resources. Success means having unique and new products or services and being a product or service leader is important. The organization encourages individual initiative and freedom”. (Orgcon Report Summary according to the case)

### **The management style**

Managers have to perform many roles in an organization and how they handle various situations will depend on their style of management. According to the applied approach (OrgCon questionnaire – Burton, Obel, 1998) the management style can be measured by the level of management's micro-involvement in decision making. Leaders could have a low or high preference for micro-involvement. As a matter of fact, it means that there are two

sharply contrasting styles: Autocratic and Permissive. ([http://www.rpi.edu/dept/advising/free\\_enterprise/business\\_structures/management\\_styles.htm](http://www.rpi.edu/dept/advising/free_enterprise/business_structures/management_styles.htm), 31.08.2011.)

In the current case the manager has a high preference for micro-involvement. It could be considered as a typical example for small firm around Go – Go phase. The authority presents itself as the power vested in a person by virtue of his role to expand resources: financial, human and technical, in order to meet the accountabilities of the role. It is very important to have a clear and distinct line of authority among the positions in an organization so-called “Chain of command”.

The manager of the reviewed company has a preference for making most of the decisions himself. This means a high preference for micro-involvement. When the Manager has a preference for using control to coordinate activities that leads toward a high preference for micro-involvement. Founder - manager needs employee’s deep feelings of affection and respect.

### **Delegation and decentralization**

Decentralization is a necessary and continuous process which means systematically delegating power and authority throughout the organization to middle and lower-level managers. It goes together with the delegation process by which a manager assigns a portion of his or her total workload to others.

The manager is “often ineffective (and frustrated). With his personal involvement in the day-to-day work of the company, the leader often has little time to manage. Work is hastily assigned with scant attention to detail”. As a matter of fact the owner does not need to be involved in all those details. This is a real sign (distinctly appeared in this case) that there is a need for decentralization. Some founders view these symptoms as further evidence that successful business depends on their personal engagement. The usual problem is that they tend to fix these problems by taking personal control (and unnecessary level of micro-involvement). “The employees are frustrated. In the face of an overwhelming workload, unclear responsibilities and fuzzy goals, employees find it increasingly difficult to be productive. New people are hired and thrown into their jobs with little training or preparation. Physical space and proper equipment can be scarce because growth is difficult to predict. Promotions can occur on the spur of the moment. Later in adolescence it often turns out that people promoted into senior management positions during previous phase do not have the skills and experience needed to succeed in that position.” ([http://www.adizes.com/corporate\\_lifecycle\\_gogo.html](http://www.adizes.com/corporate_lifecycle_gogo.html)) Often when the rules and policies

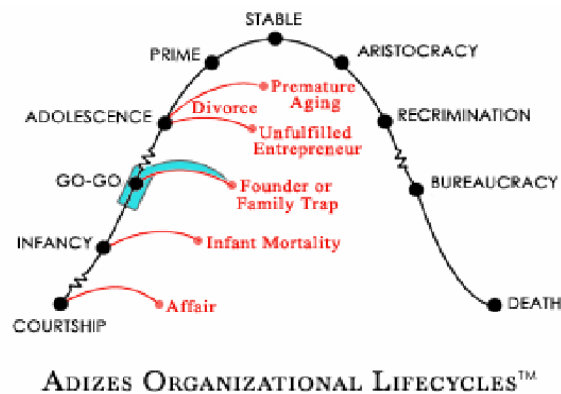


are created the founder – leader could be the first to violate them. In the Go-Go phase founders also tend to struggle with delegation and decentralization. Workable decentralization requires an effective system of control. Mistakes in delegating can bring the Founder to retake the reins of control. It can endanger the process of effective decentralization. The Founder needs to escape day-to-day details so that he can focus on the whole picture.

If perpetuated, this inability to effectively delegate will threaten organization in Go-Go phase into a premature aging syndrome known as the “Founder's Trap” (Adizes, 1990). (See figure 1.) It occurs when a rapidly growing company is unable to relieve itself from dependency on the founder. With weak control systems, accountability is very unclear no one takes responsibility. This is the stage where “everyone claims inadequate information, lack of authority, and feels they are the victims of decisions made by other people. Fingers point in all directions. This frustrates Go-Go leaders. They feel betrayed. No one warned them of the tricky dangers ahead”. ([http://www.adizes.com/corporate\\_lifecycle\\_gogo.html](http://www.adizes.com/corporate_lifecycle_gogo.html))

The urgent need is uncovered to develop functions and abilities needed between employees to replace the unique skills of the owner. If it will not happen because the owner manager is unwilling or unable to effectively delegate and decentralize control, it can become a fatal problem.

**Fig. 1** ”Go – Go phase” turning into dangerous ”Founder trap”



Source: (Adizes I., 2010 b.) a customized web report

**Integration and coordination**

It involves the collaboration among specialists needed to achieve a common purpose of the organizational sub-systems. It evolves some controlling mechanisms for smooth functioning of the organization. As a matter of fact, it means organizational counterbalance for decentralization differentiation and (in some cases) division of labor. Integration can be

achieved across various specialized units, functions to ensure that organizational goals are being pursued. "Span of control refers to the number of specialized activities or personnel supervised by one manager. There is no optimal number for a span of control and number of levels in the hierarchy. In fact, span of control and hierarchy levels are inter-related and depend on situational factors" (Barkdull, 1963). Important features to be considered while designing are: similarity and complexity of functions, need for direction and control, managerial coordination and planning requirement.

There are several methods to improve integration. (If needed, even in a small organization). These include rules and procedures and professional training. Communication is another important process in the organization crucial for achieving integration and coordination of the activities of separated units at different levels. Communication can be horizontal, downward or upward. Integration and coordination refer to integration of the objectives and activities of specialized units or sub-systems in order to achieve the organization's overall strategic objectives. In large and complex organizations coordination and integration become extremely important. It can also be improved through developing rules and procedures, and professional training (done simultaneously), with professional committees involving managers from different specialized units.

Integration aims at ensuring that different sub-systems work towards common goals. Staff meetings with the purpose of integration and coordination are held weekly in short duration for each work group (department), with the general manager present. There are no meetings for the entire staff meantime.

Some additional terms of analysis were

- Job design – "...the assignment of goals and tasks to be accomplished by employees..."
- Job enrichment – "An alternative to job specialization (that) which involves increasing both the number of tasks (job enlargement) the worker does and the control the worker has over the job become crucial too for the examined firm." (Daft, 2006).

## **Technology**

Technology is based on major activity. In the current case it is production (a unit production technology - finished products from composite material, custom-made furniture). The client only has (a) few different products, operates in one country, has a low product and process innovation, with a high concern for quality. "In an uncertain environment, it is very likely that the customers will prefer variation in products and services. Competitors are

likely to vary their strategies in products, prices, advertising, etc. New innovative strategies may be called for. Some rather non-routine technology will likely be required to adapt to an uncertain environment.” (Burton, Obel, 1998 b)

In this organization Information and accounting systems seemed to be weak. This can be typical for Go-GO phase) where only support for basic needs of production/operations, customer service and accounting exists. The client’s firm lacks useful cost accounting and accurate reporting of individual product profitability. Management reports are often published so late that they are of little use for day-to-day operations. (Insufficient cost controls, ad hoc budgeting)

### **The question of formalization**

Formalization is the degree to which an organization has rules, procedures, and written documentation. Formalization means an organization is involving installation and use of rules, procedures, and control systems.

The examined firm is organized around people and projects. Responsibilities are assigned based on who can do the work on a project-by-project (product - task) basis. New tasks often conflict with previous assignments. Often the organization chart does not accurately reflect the way work really gets done.

## **DISCUSSION**

### **Strategic design recommendations**

According to the cited literature and applied practice knowledge the results of the performed analyses show comparisons between the theoretical input modules and identified appropriate practical organizational solutions. The basic aim was to diagnose and solve the fundamental discrepancies between contingency factors and elements of organizational properties. As a result some of the identified values of major factors and properties in the analyzed organization derailed from universal principles of management and contingencies, that means urgent adjustment is needed in the client’s firm.

When many factors in the environment affect the organization, it may make it difficult for a defender like the client’s firm to protect what it does and also difficult to protect its established market position. Therefore, the defender strategy is not appropriate. An analyzer strategy is more appropriate for this complex environment. Here the analyzer should seek out opportunities in the complex environment.

The current organizational complexity is low. Understandably due to the fact that it is a small firm with medium horizontal differentiation, low vertical and low geographical differentiation. (It is only in one location).

The most likely configuration that best fits the situation for the client has been estimated to be a functional configuration. A functional organization is an organization with unit grouping by functional specialization (production, marketing, finance, etc.).

The current formalization is medium but there should be high formalization between the organizational units but less formalization within the units due to the high professionalization. Since the firm employs many professionals the formalization should not be as high as it would otherwise be. When the organization is in the manufacturing industry and it has a routine technology, its formalization should be lower than if it were in the service industry. When the organization uses an advanced information system, formalization should be high. A defender strategy needs cost efficiency and that can be obtained through formalization. Organizations with routine technology should have high formalization. High formalization is consistent with top management's preference for a high level of micro-involvement.

The organizational life cycle phase “The Founder's Trap” (uncovered pathologies for Go-Go) “occurs when a Go-Go company is unable to relieve itself from its dependency on the Founder. The company is trapped by the capabilities and limitations of the bottleneck that is its Founder. This can occur because the organization is unable to develop the abilities needed to replace the unique skills of the Founder. The slide into the “Founder’s Trap” can also occur because the Founder himself is either unwilling or unable to delegate effectively and decentralize control. Developing the skills, systems, trust and respect needed to support delegation and decentralization is a crucial task for the given client. The process starts with delegation from the Founder, which involves transferring responsibility for important tasks down into organization and creating the commitment needed to achieve the desired results. But, forcing this transition before it can be effectively supported will foster mistrust and animosity between the Founder and the employees” (the future senior management team), and exacerbate the Founder's “Trap” pathology. ([http://www.adizes.com/corporate\\_lifecycle\\_gogo.html](http://www.adizes.com/corporate_lifecycle_gogo.html)) Go-Go companies must begin to make the transition from management-by-intuition to a more professional approach. Stage of Founder’s trap should be avoided by staggered empowerment. That can be achieved through:

- aligned role with capability,

- aligned tasks with the role,
- aligned resources with accountability,
- context or value provided by the manager.

Consistent human resource management builds responsibility, enables avoiding confusion in roles and frustration of employees.

The motivational system should develop a feeling of obligation in employees and also the system of values, standards, conscience and aspirations that individual demands of himself or herself. It relates to one's own standards, conscience, values and aspirations.

Incentives should be based on results and procedures. The client's coordination and control should be based on rules and procedures, integrators could be group meetings and some mutual planning. Unannounced and unproductive meetings should be avoided. A moderate amount of information will be required and it is not likely that there will be a need for rich information (nor for wide channels of information).

On the field of formalization the current client should consider increasing the number of positions for which written job descriptions and written rules and procedures are available. According to the defined measures the supervising of the employees should be closer.

## **CONCLUSION**

One of the major misfits that created obvious problems was the un-adjusted (defender) strategy with the business environment and organizational climate. The reason lies in the lack of delegation and decentralization. The pathological Go-Go's "founder trap phase" spontaneously formed because of the overloaded owner's inability to form and control strategy. It slowed down the process of growth, derailed the organizational forces, such as creativity, and led to the diagnosed "founder trap". This stage threatens healthy development; it cannot be maintained over a longer period. Missing adequate organizational structure with poorly defined division of labor additionally worsens the situation. Very often "a single misfit may make the whole design unacceptable". (Burton, Lauridsen, Obel, 2002)

The detected situation shows misfits in a routine technology and uncertain environment because it can cause problems. For this contingency some non-routine technology is better! "A routine technology produces goods and services efficiently which are standard and without variation. Low product innovation but a certain environment calls for a review and suggests that the organization consider greater product innovation. Low product innovation

means that the same products are available for an extended period of time. In a certain environment with little change in customer demands and preferences, there is little need for new products. But, with increasing uncertainty in customer demand, new competitor strategies, possible governmental actions, shifting customer tastes, etc., current products are likely to become soon mismatched with the possibly changed environment. New products and innovation will likely be required to adapt and meet the emerging needs and opportunities of the new business environment” (Burton, Obel B, 1998 b)

It is evident that the client’s firm needs to make the recommended interventions to return on the fastest possible track of development.

Such simplified approach, showed in the article can give a model that would assist analysts to deal with more widely recognized factors. The majority of those considered organizational glossary terms should be considered when diagnosing and designing organizations of any type and in any contingency circumstances. Users are asked to identify organizational design parameters in order to change their settings (if necessary). In this case the majority of important contingencies have been identified. It is also shown that the selected and analyzed terms can provide wider and guided possibilities for organizational analyses in even more complex situations. The suggested model of thinking or qualitative analytical approach may be applicable to the majority of managerial issues.

### **Summary**

Establishing an organization, setting it on track of development is becoming a more and more complicated task and in most cases, requires expert knowledge. Scientific organizational theory offers a great variety of applicable methods and tools for small and young enterprises as support for their design and development. The performed case study is based on consultancy work at local Business Incubator in Subotica. Because as a management consultant, the basic role or challenge was to identify and investigate problems connected with the case and to control implementation of the recommended actions.

Organizing becomes crucial managerial function of arranging people and resources to work toward a goal. The purposes of organizing include, but are not limited to determining the tasks to be performed in order to achieve objectives, dividing tasks into specific jobs, grouping jobs into departments, specifying reporting and authority relationships, delegating the authority necessary for task accomplishment.

The study is written with the aim to offer a theoretic approach to solving the rising empirical problem of organization, giving the model of thinking for comprehension of diversity when designing - creating, restructuring organizational architecture typical for small enterprises.

This article presents the author’s approach, examination and description of some of the most common problems of small enterprises. A number of organizational theoretical terms were considered and have been connected with the specific case. The basic aim of the project was to solve a set of actual organizational problems for one of the business incubator tenants. The analyzed group of problems were related to the structural design of an organization (e.g. existing simple structure vs. functional), division of labor, job design, decentralization, delegation, formalization and standardization, and span of control.

As an uninvolved person (only in the role of a consultant) the task was also to overview the potential processes of derailment in application of prescribed treatment. (E.g. Not to allow the management to gradually leave the necessary change process, to audit if the necessary additional efforts were made to reduce the occasional

resistance that risks the main objectives to disappear. Not to allow only cosmetic changes to happen but making insufficient effort to forward the process of the needed change).

The applied methods were based on classical organization theory, contingency theory, Adizes life cycle of organizations, and other different partial approaches. This expanded approach involves mechanistic and morganatic viewpoints too. Organisations can become sick, just as people do. Like people, organisations can be structurally sick or behaviourally sick. The various “symptoms” can be studied, hopefully, within a diagnostic framework that would enable an accurate diagnosis to be made and treatment prescribed to bring about a healthy, productive and successful organisation. In this article some comparisons are made between human maladies and organisational problems between medical and “organisational diagnosis”. This kind of “organic” approach shows some new possibilities in studying the organisational effectiveness and “health”.

The selected methods give us an opportunity to uncover some of the extremely dangerous misfits (e.g. inappropriateness of strategy and goals, configuration, organizational climate, leadership style, etc. The basic aim was to diagnose and solve the fundamental discrepancies between contingency factors and elements of organizational properties in order to find the best possible total design fit. The process of diagnosis has uncovered that some of the identified values of major factors and properties in the analyzed organization derailed from universal principles of management and contingencies, that means urgent adjustment was needed in the client’s firm.

Far from the full set of factors that an up-to-date contingency survey uses, this article considers only a few aspects with special focus on small enterprises and their typical symptoms. The contingency views as part of the leading theoretical approach of organizational design help us consider some aspects relevant in analyzing conditions of strategy formation and its influences on structure and organization “health” (fitted to be fit). These contingency factors include external and internal environment, management style, climate, size and ownership, technology, and properties of organization such as complexity and differentiation, formalization, centralization, span of control, rules, procedures, flow of information – media richness, incentives, etc). It is assumed that the characteristics of strategy and other market devices correlate with specific contents of the contingency factors for organizational structure as well as with properties and structural configuration of the organization.

The purpose of this research was achieved. With the described approach we obtained a powerful tool, strong enough to enable the manager (the client) to merge diverse elements of their small enterprises, learn to make successful combination for functioning in new structural design, and controllability.

The study offers a managerial toolkit for the business person or consultant who wants to make his or her organization better. Direct focus was on design, supported by the science of organization theory, which provides the basis for the diagnosis and design. While the task was successfully completed, it seems this combined approach lends proof to the problem solving possibilities of such combined methodical approach of applying organizational theoretical knowledge in practice.

### **Summary in Hungarian**

#### **MIKÉNT ADJUNK ELMÉLETI MEGOLDÁSOKAT GYAKORLATI SZERVEZETI PROBLÉMÁKRA – ESETTANULMÁNY**

A vállalatok megalapítása és a fejlődés irányába fordítása egyre inkább összetett feladattá válik, és az esetek többségében szakértői tudást igényel. A tudományos szervezetelmélet az alkalmazható eszközök, módszerek széles skáláját kínálja. A kis és középvállalkozások projektálása és fejlesztése esetén is. A bemutatott esettanulmány a szabadkai ügyviteli inkubátorban végzett tanácsadói (konzultáns) munka eredménye. Menedzsment konzultánsként az alapvető feladat illetve kihívás a szervezeti problémák feltárása kivizsgálása és a javasolt megoldások alkalmazásának ellenőrzése volt.

A célok elérése érdekében a menedzsment funkciók között kulcsfontosságúvá vált a szervezés. A szervezés céljai leginkább, nem szűkítve azok körét, a szükséges feladatok meghatározását, csoportosítását, egységekbe tagosítását, jog -körök és felhatalmazások kialakítását jelenti.

A tanulmány azzal a céllal íródott, hogy elméleti megközelítést - modellt kínáljon az egyre növekvő és sokasodó gyakorlati szervezési problémák megoldásához, a kis és középvállalatok kialakításánál és átszervezésénél.

A cikkben a szerző néhány a kis és középvállalatokra legjellemzőbb problémának a megközelítését és vizsgálatát mutatja be. Számos szervezetelméleti kifejezés – fogalom lett figyelembe véve a konkrét eseten

keresztül. A (konzultáns) projekt célja néhány szervezeti probléma megoldása volt az ügyviteli inkubátor egyik (albérlő – ügyfél) cégénél. Az elemzett problémák a szervezeti konfiguráció kérdésére (a meglévő egyszerű struktúra vagy a helyette kialakítandó funkcionális struktúrára) munkamegosztásra, munkakörök leírására, decentralizációra, delegációra, szabványosításra, ellenőrzési feszítávrá vonatkoztak.

Külső résztvevőként (csak a konzultáns szerepében) a feladat még az esetleges eltérések felügyelete és a javasolt megoldások alkalmazásának ellenőrzése is volt. (Például: nehogy a menedzsment fokozatosan letérjen a szükséges átalakítási folyamatról, ellenőrizni vajon megtették-e a kellő erőfeszítéseket az esetleges ellenállások felszámolásához melyek kockáztathatják a alapvető célok, megvalósítását. Nem szabad megengedni a látszólagos változtatásokat vagy nem kielégítő intézkedéseket a szükséges változtatások végrehajtásánál.)

Az alkalmazott módszerek klasszikus szervezettelmélet, kontingencia - elmélet, a szervezetek Adizes szervezeti életciklus, illetve más részleges megközelítéseken alapultak. Ez a kiszélesített megközelítés magába foglalta a mechanisztikus és az organikus aspektusokat is. Mint ahogy az emberek a vállalatok is megbetegedhetnek, szervileg azaz strukturálisan vagy mentálisan magatartásukban. A különböző tünetek segíthetik a pontos diagnózis felállítását és a megfelelő gyógymód meghatározását egy egészséges, termékeny (termelékeny) és sikeres szervezetet érdekében. Ebben a cikkben néhány összehasonlítást tehetünk az orvosi és a szervezeti diagnózis között, az emberi betegségek és a szervezeti problémák között. Ez a szerves megközelítés bevezet néhány új lehetőséget a szervezeti hatékonyság és egészség tanulmányozásában.

A kiválasztott módszerek lehetőséget adtak arra, hogy felfedődjenek rendkívül veszélyes szervezeti körülmények (a stratégia és a célok, a konfiguráció, a szervezeti klíma, a vezetői stílus, stb. összehangolatlansága. Az elsődleges cél a kontingencia - tényezők és a szervezeti jellemzők alapvető ellentmondásainak diagnózisa, majd teljes egyeztetése, azaz a szervezeti összhang kialakítása volt. A szervezeti diagnózis felállításának folyamata több ellentmondást is feltárt, (például eltéréseket az általános menedzsment elvektől) és e körülmények sürgős egyeztetést (beavatkozást) igényeltek a megbízó cégénél.

A kontingencia - elmélet teljes eszköztárától eltekintve, a cikk csak néhány a kisvállalatok tipikus tüneteire - szempontjaira összpontosít. A kontingencia - elmélet a szervezetek tervezésénél segíti néhány fontos feltétel körülmény elemzését. Ilyenek a stratégia megalkotása és a szervezet egészsége („testre szabott egészség”). E kontingencia - tényezők magukban foglalják a: külső és belső környezetet, vezetői stílust, szervezeti klímát, a vállalat nagyságát, tulajdonviszonyokat, technológiát. Ezen túl felöleli az egyéb szervezeti jellemzőket, mint, a komplexitás, a differenciálódás, formalizálás, központosítás, ellenőrzési feszítáv, feladatkörök és folyamatok, az információ keringése (csatornái), a motiváció, stb. Feltételezhető, hogy a stratégia és a piac jellegzetességei összefüggnek (korreláltak) a kontingencia - tényezőkkel, ugyanúgy ahogy a struktúrával vagy a szervezet többi jellemzőivel is.

A kutatás célja megvalósult. A leírt megközelítéssel egy hathatós eszközt biztosítottunk mely lehetővé tette a menedzsmentnek (az ügyfélnek), hogy egyeztesse (összehangolja) kisvállalkozásának különböző elemeit, és működőképes irányító struktúráját sikeressé tegye.

A tanulmány vezetői irányítói eszköztárat kínál a menedzsmenteknek vagy a tanácsadóknak, akik jobbá szeretnék alakítani vállalataikat. Így a közvetlen figyelem a szervezettelmélet által biztosított tudományos szervezeti diagnózisra és tervezésre irányult. Mivel a feladat sikeresen meg lett oldva, úgy tűnik, hogy ez a kombinált szervezettelméleti tudás bizonyítottan megoldást nyújthat a gyakorlati alkalmazásban is.

#### **Kulcsszavak:**

Szervezettelmélet, szervezeti diagnózis, kontingencia elmélet, a szervezetek életciklusa,

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## **TRENDS IN PRODUCTION AND PROCESSING OF MEAT IN THE REPUBLIC OF SRPSKA**

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## **TRENDS IN PRODUCTION AND PROCESSING OF MEAT IN THE REPUBLIC OF SRPSKA**

### **Key words:**

Livestock production, production and processing of meat, trends, Republika Srpska

### **Abstract:**

In the Republic of Srpska (Entity of Bosnia and Herzegovina), livestock, especially cattle and sheep, have a long tradition. The potential for the development of animal husbandry is a major, taking into account the available land capacity. On the other hand, consumption of proteins of animal origin grows proportionally with the increase in living standards. EU countries are also moving away from the strategy of further intensification of production of animal products because it would have meant even greater pressure on land resources, biodiversity, and quality and safety of products, and this is not what European producers now want. This situation creates room for producers from RS to create supply for the European market. The aim of this paper is to demonstrate the capabilities and trends in meat production in the Republic of Srpska, and the willingness of this part of the RS economy to compete in the European market. The authors used the method of comparative analysis to observe the livestock and meat production in the RS in the period 2005-2011.

### **Кључне речи:**

сточне производње, производња и прерада меса, трендови, Република Српска

### **Сажетак:**

**Трендови у производња и преради меса у Републици Српској**  
У Републици Српској (Ентитет Босне и Херцеговине), сточарство, а нарочито узгој говеда и оваца, имају дугу традицију. Потенцијал за развој сточарства је велик, узимајући у обзир расположиве капацитете земљишта. С друге стране, потрошња протеина животињског порекла расте пропорционално са повећањем животног стандарда. Земље ЕУ не могу да задовоље потребе протеина животињског порекла из сопствених извора. Земље ЕУ се такође удаљавају од стратегије даљег интензивирања производње анималних производа, јер би то значило још већи притисак на одрживо кориштење земљишних ресурса, биодиверзитет и квалитет и безбедност производа, а то није оно што европски произвођачи сада желе. Ова ситуација ствара простор за произвођаче из РС да створе залихе за европско тржиште. Циљ овог рада је да покаже могућности и трендове у производњи меса у Републици Српској, као и спремност овог дела привреде РС да се такмиче на европском тржишту.

Аутори су користили метод упоредне анализе за посматрање обима сточарске производње и производње меса у РС у периоду 2005-2011.

## **INTRODUCTION**

In the RS there are climatic, geographic, and socio-economic conditions for the development of agriculture, especially livestock. The rapid development of the organized commercial agriculture is disturbed by small and fragmented land (small plots of land), technical knowledge of producers (modern methods and the latest developments in agriculture), availability of raw materials (seeds, breeding materials, plant protection, fertilizer) as well as lack of funds and reducing the purchasing power of most of the population. On the other hand, consumption of proteins of animal origin grows

proportionally with the increase in living standards. Thus, the consumption of these types of proteins in the EU is twice the world average and the trend is increasing because of growth in living standards, due to EU enlargement and increase of population. EU countries cannot meet the needs of the proteins of animal origin from its own resources. EU countries are also moving away from the strategy of further intensification of production of animal products because it would have meant even greater pressure on land resources, biodiversity, and quality and safety of products, and this is not what European producers now want (European Commission, 2010). This situation creates room for producers from RS to create supply for the European market. The aim of this paper is to demonstrate the capabilities and trends in meat production in the Republic of Srpska, and the willingness of this part of the RS economy to compete in the European market.

### OBJECTIVES AND METHODS

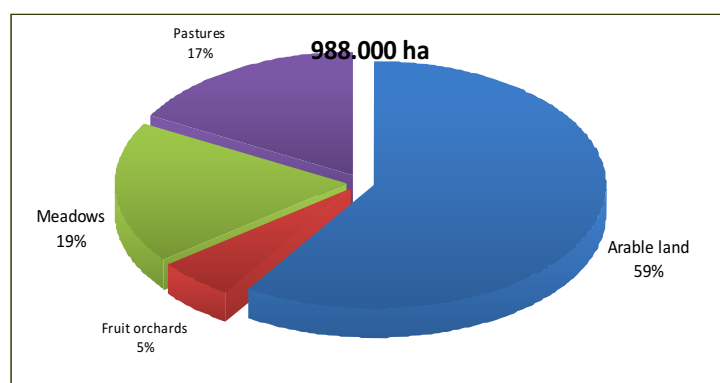
The authors used the method of comparative analysis to observe the livestock and meat production in the RS in the period 2005-2011. The analyzes investigates the trends in the growth of livestock number, as well as the quantity of meat produced, calculated on the basis of the base index, with 2005 as base year. The data sources used were official publications of the Institute of Statistics.

The level of the trade balance has been analyzed through the value of foreign trade, imports and exports for the period 2005-2009, for which period data were available. The data are taken from official publications of the Foreign Trade Chamber of BiH and relate to BiH as a country, given that the foreign trade exchange is in the jurisdiction of the state rather than entity in Bosnia.

### RESULTS AND DISCUSSION

#### The situation of livestock production in the RS

The available arable land is very important for the development of agricultural production, notably livestock production. There is available, in average, around 988.000 ha in the Republic of Srpska (Fig. 1.).



**Fig. 1** Structure in RS for 2009.

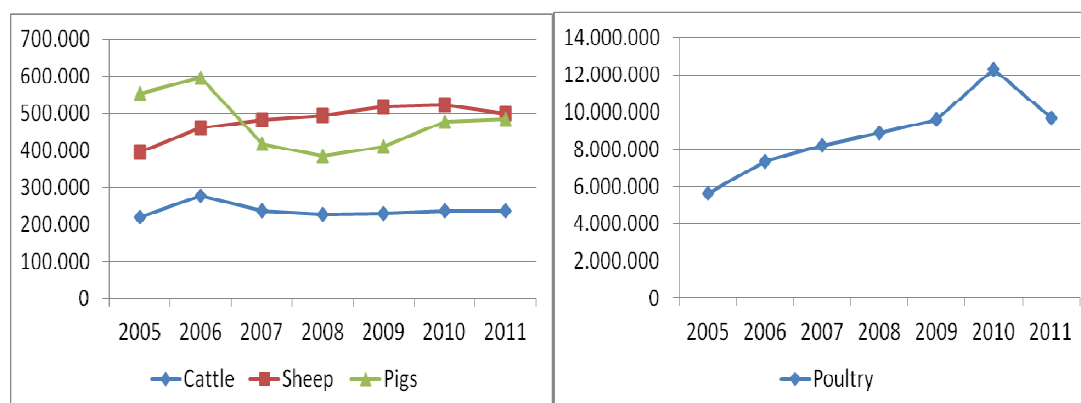
of sown area

Source: Statistical Annual Bulletin ISSN 2232-7312, Banja Luka, December, 2010. p.149

- At 70-80 000 ha - forage crops are cultivated annually,
- On average 147 000 hectares annually produces about 550 000 tons of maize,
- At average of 3.5 thousand ha - about 6.5 thousand tons of soybeans are produced annually,
- The area of sown arable land (in 2009 - 368 000 ha), about ½ is in use for production of production of fodder.

In the RS agriculture, livestock production has great economic importance. Status and development of livestock production is the most reliable indicator of the development of agrarian sector of any country, including the RS. The significance of the development of livestock production is reflected in the fact that the ruminants exploit surface under natural grasslands (meadows and pastures), which in the structure of agricultural land covers about 36%. Figure 2 shows the level of livestock production in the Republic of Srpska for the period 2005-2011 analyzed for cattle, sheep, pigs and poultry.

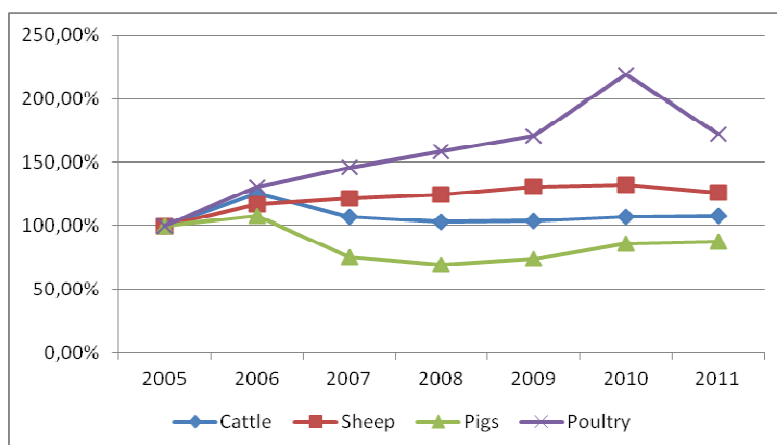
**Fig. 2** The livestock production in the RS, number of heads per year for the period 2005-2011



Source: Statistical Annual Bulletin ISSN 2232-7312, Banja Luka, December, 2010. p.162

In terms of number of the individual types of livestock it can be seen that the number of poultry and sheep in the seven-year period had an increasing trend, while in cattle and pigs, although the first year, recorded an increase, the number of cattle in the last years has declined. According to the indices of production for the base year 2005, we can conclude that all species of livestock other than pigs had a positive index value. The average growth in cattle production compared to 2005 was 8.89% per year, with highest values in 2006 and the lowest in 2008. Production of sheep had an average increase of 25.29% per year, with highest values in 2010, and lowest in 2006. Production of pigs has not reached the level of production in 2005 and the average index compared to this year was only 83.17%. The lowest index was recorded in 2008 when total production fell to 69.37% of production in 2005. Poultry production has, as stated above, the highest growth with an average annual rate of 66.14%. The greatest value of poultry production has being reached in 2010 with over 200% growth index compared to 2005, but in 2011 this index has declined by 30% (Figure 3.)

**Fig. 3** The indexes of the RS livestock production (2005-2011)



Source: Own calculation

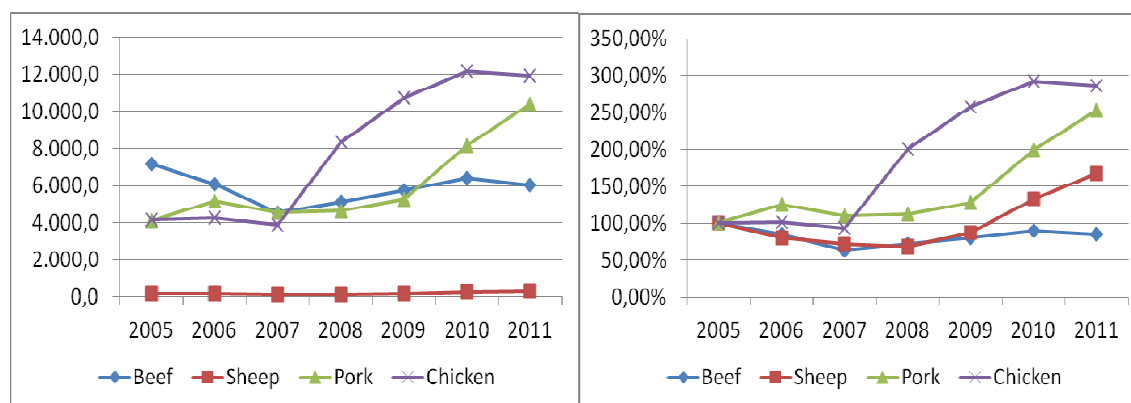
Analysis of meat production showed somewhat different trends of total production and growth indices during the analyzed period. **Cattle** as one of the most important branches of livestock production in the RS are very widespread and are present in most farms. During the monitoring period, the average production of beef was 5.852,46 tons. However, production indices show negative growth and that the level of production throughout the analyzed period fall below the level of production in 2005 and fluctuated around an average of 79.10%. The largest decline in beef production was in 2007, when we saw the fall in

livestock production in the RS. This leads to the conclusion that the production of beef is directly dependent on the production of livestock or the number of beef in RS.

**Pig** production, in addition to cattle breeding and poultry production, is a very important branch of animal production. According to statistics, the total production of (pork) meat for the monitoring period ranged, on average, around 6.028.73 tons. For the monitoring period, on average, pork production per capita was about 3 kg, which is very low production, especially if you consider the possibilities of this production in RS. Pork production indices show an extremely high value of the average growth of 54.67% per annum, as compared with negative growth in the number of pigs. This is evidence of increased imports of pigs in the RS and the loss of local ties inoculants production and processing in the pig production.

**Sheep** production in the RS is most prevalent in the hilly mountainous areas, which are rich in large parts of the natural pastures. The RS is characterised mainly with the extensive production of sheep, with a mixed production of meat, milk and wool. Production of sheep meat is modest compared to other meat types. Average annual quantity is around 170 tons. But we have to take into account that, traditionally, sheep meet is marketed trough direct sales which is not recorded by statistical office. Index of sheep meat production averaged 25.29% annually compared to 2005 and had a steady growth since 2006 (Figure 4.).

**Fig. 4** The volume and index of meat production in RS, number of heads and tones of meat, (2005-2011)



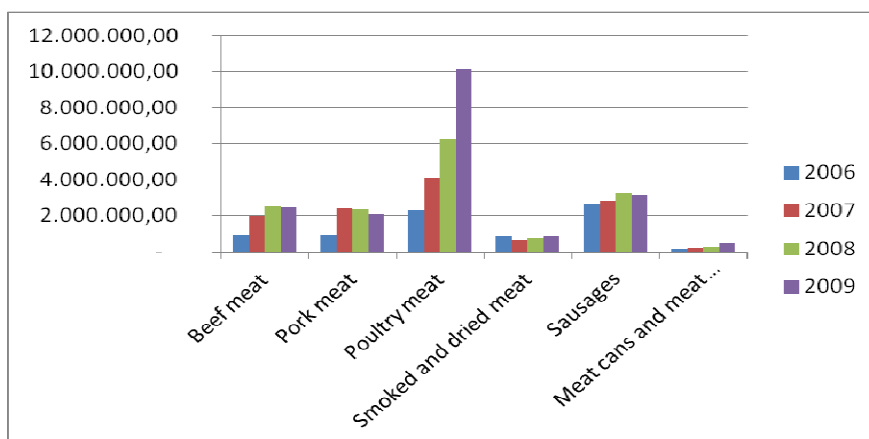
Source: Statistical Annual Bulletin ISSN 2232-7312, Banja Luka, and own calculation

Processed meat, especially dry and smoked meat, is a tradition in the RS, which lasts for centuries. What started as just one of many activities that are performed in a household, and then turned into a cottage industry, today represents a significant portion of the food sector. RS with its own present production is unable to close the balance of meat and therefore larger quantities of meat are imported, especially for processing. Those are primarily economic reasons, i.e. the global market offers a large quantity of frozen meat, much

cheaper than domestic production, but poor quality. Low prices of imported meat have disincentive effect on domestic production of meat (Mirjanić et al., 2010, 2011).

During the monitoring period in the RS, the amount of purchased livestock for slaughter has increased, and increase in the total quantity of meat originating from local slaughterhouses, especially in poultry (Figure 5).

**Fig. 5** The amount of meat and meat products in the period 2006-2009



Source: Statistical Annual Bulletin ISSN 2232-7312, Banja Luka, December, 2010.god. Industrija, p.191

According to the relevant ministry<sup>3</sup> in 2008, RS processed 2.506 tons of beef, 2.329 tons of pork and 6.616 tons of chicken meat. In the processing of beef and chicken meat a significant increase was noted, while in the production of pork, slight decrease was noted in comparison with the previous year. With respect to meat processing, production of sausages and canned products increased. According to the same source, the capacity of meat processing industry in the RS use only 20-25% capacity, which indicates their low level of usage. In addition, many do not meet the required standards, which is one of the reasons for their poor competitiveness in international markets.

According to MoA total number of processing capacities is 262, of which only 35 industrial buildings and 226 craft, out of 35 industrial facilities, 12 are into bankruptcy or ceased operations.

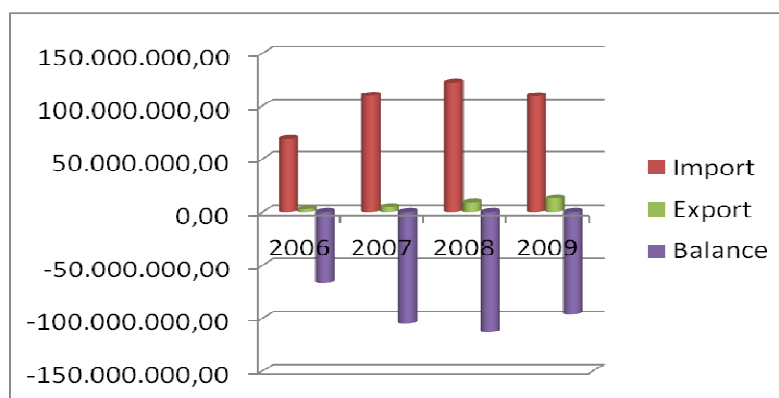
### Foreign trade

Foreign trade of agricultural products and foodstuffs of BiH, and RS within, showed chronic deficits (Figure 6).

<sup>3</sup> Information on status and conditions in food industry in RS in 2008. MAFWM RS, 2009, p.5.



**Fig. 6** Balance of exports and imports of meat and meat products on the BiH level



Source: Own calculation

The opportunities of placement of meat in foreign markets are evident, but this placement is limited to a certain number of countries. In most cases, the exports of meat are due to incompatibility of veterinary-sanitary regulations with regulations in the environment. In addition, there is insufficient motivation of primary production to enter into commercial production.

Then, failure of basic safety standards, improper organization of purchasing, quality inconsistency, lack of knowledge of foreign markets, are just some of the reasons why the potential for exports, which exists in this sector, is not used.

**Table 1** Bosnia and Herzegovina and the EU trade of agricultural products

EU import from BiH (in mil. €)	2008	2009	2010	EU export to BiH (in mil. €)	2008	2009	2010
Sugar	7,5	6,5	7,0	Cereals	79,2	28,4	39,5
Fruits	6,2	7,1	10,6	Dairy products, eggs, honey	27,9	26,2	36,6
Vegetable	3,6	5,4	8,9	Sugar	8,9	8,5	8,2
Leather and fur	26,8	16,6	36,3	Meat and meat products	20,1	24,8	29,5
Oils	5,5	10,4	10,8	Oils	18,6	23,5	21,6

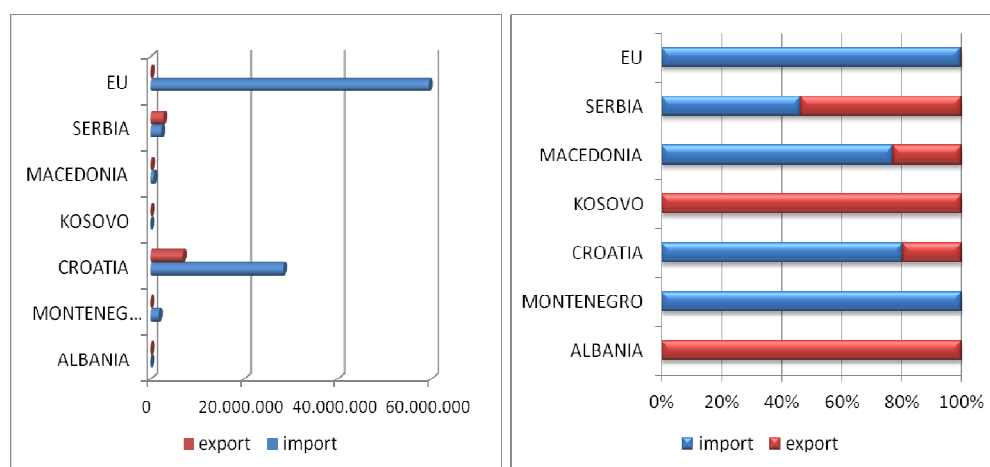
Source: Statistical Annual Bulletin ISSN 2232-7312, Banja Luka, December, 2010.god

Based on the above review (Table 1) it is clear that BiH and the RS do not use the comparative advantages in the production of meat, but on the contrary, they appear as a net importer of meat from the European Union.

### The market chain in meat production and processing

The market chain in meat production is largely unorganized and short, because a large part of production ends within the household or in local markets (official and unofficial). One part of the production, however, is collected/purchased through the slaughterhouses, directly or through intermediaries, making it possible to extend the chain of production thus generating additional value of the product. Small amounts of meat products are exported to neighbouring countries (Albania, Serbia, Croatia), Figure 7.

**Fig. 7** The value and the ratio of imports and exports of meat products in BiH with neighbouring countries and EU, 2010



One of the main reasons for short market chain is that a significant portion of production is in the hands of small producers, mainly with extensive production. The largest portion of meat is produced by family farms that are commodity producers with ten bullocks, a hundred pigs and sheep and in recent years, there is a tendency to increase Poultry production with 10 000 chickens for fattening. There are also organized producers (relatively large producers for the conditions of production in the RS) who fatten cows on their own farms or in the organized fattening on member farms. This situation indicates that production can be distinguished in three groups of producers of meat, that are determined by different production and sales market chains,<sup>4</sup> Table 2.

<sup>4</sup> National Program of rural development of Serbia 2011-2013, Belgrade, 2011.

**Table 2** Market chains in the production of processed meat in RS

Small producers	Commercial producers	Relatively large producers
<ul style="list-style-type: none"> <li>- Not participants in the official meat sales channels</li> <li>- meat produced for their needs</li> <li>- small quantities of live animals or meat sold in own household</li> <li>- they are important for food security</li> <li>- poor standards of production, storage and food security,</li> <li>- Taking into account all standards and demanding users, in order to keep control of production, it is necessary to be engaged in official channels that guarantee health safety.</li> </ul>	<ul style="list-style-type: none"> <li>- Product Group with largest part of production</li> <li>- usually sell their products to registered slaughterhouses, either directly or through intermediaries</li> <li>- mainly produce feed and are engaged in both farming and cattle production</li> <li>- They are the most important group, thereby a priority of agricultural policy to allow them further growth in the future.</li> </ul>	<ul style="list-style-type: none"> <li>- Companies engaged in the production of animal feed, processing or selling of meat trying to establish a vertical connection, which would reduce the market or price fluctuations that are characteristic for meat production</li> <li>- In addition to them, there are companies that saw their opportunity for profit in meat producing and through the privatization process came to productive resources</li> </ul>

Medium-sized producers are most important from the perspective of agricultural policy, because the biggest production is done by them in all areas of meat (beef, pork, lamb and poultry).

**Reform of the CAP as a chance for producers of meat in RS**

Livestock sector of the EU had a steady growth in recent decades. The old EU12 Member States had the strongest growth in the period 1961-1985, when milk production increased by 70%, pigs by 120% and poultry by 300%. Production of beef and milk stagnated after 1985, mainly as a result of changes in the CAP. Production of pig and poultry continued to grow by around 4% per annum. Today the EU is a net importer of beef and mutton, and a net exporter of pork and dairy products.

Livestock production in the EU is heavily influenced by the Common Agricultural Policy - CAP. Although the CAP in the last few decades has experienced significant reforms and further characterized by direct subsidies and export taxes that exist for most livestock

products. Long-time negotiations within the World Trade Organization - WTO on the reduction of export subsidies for EU products can cause a rise in prices of livestock products from the EU, taking into account production costs suffered by EU producers. Therefore, the sharp sanitary regulations that the EU imposes on imported products of animal origin, are the how the EU protects the domestic market.

Apart from market measures next important factor that can affect change CAP in terms of support for livestock production is the impact of this kind of production on the environment and ecological factors. Feed production requires large amounts of land, water and other inputs, and produces large amounts of nitrogen and leads to the greenhouse effect. Livestock production accounts for about 10% of total greenhouse gas emissions at the EU level. About 75% protein livestock feed needed in the EU production are covered from imports, mainly soybeans from countries of South America, allowing the EU to indirectly affect the environmental factors of production outside its territory.

Directly related to livestock production were also questions about the conditions of keeping animals and animal health care. The last 10-15 years the EU market was disturbed by the great crises ranging from mad cow disease and foot-and-mouth disease, bird flu, swine fever, etc.

All these factors influence the policy to support livestock production from the EU budget, and on the other side on the preferences of EU consumers. No EU tax payers want to set aside money for the production of products of suspicious quality, which is, in addition, disrupt the balance of the environment, neither the EU consumers want to consume such products. Awareness of EU consumers therefore moves in the direction of consuming products that are produced in an environmentally healthy area, which meet their quality and hygiene standards (The European Union, PBL Netherlands Environmental Assessment Agency, 2011).

## **CONCLUSION**

In the Republic of Srpska a relatively small amount of meat is produced, with respect to the available natural resources. Therefore, this is a limiting factor in supply in the domestic and foreign markets. On the other hand, coming closer to the EU market and the characteristics of demand in this market provide an opportunity for domestic producers to increase production for export. Therefore, there is a need to increase livestock production through:

- better organization of fattening cattle in terms of compliance capacity of primary and secondary production, and development of strategic orientation in the production and processing of meat, in this sense to harmonize the institutional, political and economic support systems prevailing in the country with the strategic orientation of sectoral policies;
- improving the quality of production especially in terms of ensuring continuity and quality level, in this sense, the introduction of quality grades of carcasses at slaughter, especially in pigs, go to the system of buying meat per unit and not kilo, hence producers would be stimulated and rewarded for better quality meat in its production;
- improve the situation in the meat production and processing by economic measures, which occurs as a necessary precondition for export, but also use pre-accession funds, including making available soft lending to investment in livestock production, and systematic support measures that would be compatible with economic and organizational rules in livestock;
- encourage efficient forms of cooperation between producers, feed industry for poultry and processing industries and in that sense, support the establishment of agricultural chambers, which would bring together representatives of all sectors in the chain and allow the establishment of rules and agreements in the field of production and market agricultural products;
- Establishing laboratories for testing the quality of meat, and accrediting them, in order to adequately monitor the quality and provide support of local institutions to the export of products of animal origin
- an increase of work on prevention and combating of infectious diseases in order for BiH to obtain a license for the export of products of animal origin;

Taking into account the resources available and the needs of European consumers for high quality protein of animal origin, one of the strategic orientations of Srpska in the period before accessing the European Union could be the production of animal products, i.e. primarily meat for the European market.

### **Summary**

One of the strategic objectives of economic policy of each country is to improve food production, in order to attain the higher level of self-sufficiency in food needs. On this basis, it follows that meat production is a very important resource for food production, so that production is given adequate attention both legal and institutional. In the Republic of Srpska (Entity of Bosnia and Herzegovina), livestock, especially cattle and

sheep, have a long tradition. The potential for the development of animal husbandry is a major, taking into account the available land capacity. On the other hand, consumption of proteins of animal origin grows proportionally with the increase in living standards. Thus, the consumption of these types of proteins in the EU is twice the world average and the trend is increasing because of growth in living standards, due to EU enlargement and increase of population. EU countries cannot meet the needs of the proteins of animal origin from its own resources. EU countries are also moving away from the strategy of further intensification of production of animal products because it would have meant even greater pressure on land resources, biodiversity, and quality and safety of products, and this is not what European producers now want. This situation creates room for producers from RS to create supply for the European market. The aim of this paper is to demonstrate the capabilities and trends in meat production in the Republic of Srpska, and the willingness of this part of the RS economy to compete in the European market.

The authors used the method of comparative analysis to observe the livestock and meat production in the RS in the period 2005-2011. The analyzes investigates the trends in the growth of livestock number, as well as the quantity of meat produced, calculated on the basis of the base index, with 2005 as base year. The data sources used were official publications of the Institute of Statistics. The level of the trade balance has been analyzed through the value of foreign trade, imports and exports for the period 2005-2009, for which period data were available. The data are taken from official publications of the Foreign Trade Chamber of BiH and relate to BiH as a country, given that the foreign trade exchange is in the jurisdiction of the state rather than entity in Bosnia.

The results of the research show that the significance of the development of livestock production is reflected in the fact that the ruminants exploit surface under natural grasslands (meadows and pastures), which in the structure of agricultural land covers about 36%. According to the indices of production for the base year 2005, we can conclude that all species of livestock other than pigs had a positive index value. The average growth in cattle production compared to 2005 was 8.89% per year, with highest values in 2006 and the lowest in 2008. Production of sheep had an average increase of 25.29% per year, with highest values in 2010, and lowest in 2006. Production of pigs has not reached the level of production in 2005 and the average index compared to this year was only 83.17%. The lowest index was recorded in 2008 when total production fell to 69.37% of production in 2005. Poultry production has, as stated above, the highest growth with an average annual rate of 66.14%. The greatest value of poultry production has been reached in 2010 with over 200% growth index compared to 2005, but in 2011 this index has declined by 30%.

Then, failure of basic safety standards, improper organization of purchasing, quality inconsistency, lack of knowledge of foreign markets, are just some of the reasons why the potential for exports, which exists in this sector, is not used.

Therefore, there is a need to increase livestock production through: better organization of fattening in terms of compliance capacity of primary and secondary production, improving the quality of production especially in terms of ensuring continuity and quality level, improve the situation in the meat production and processing by economic measures, which occurs as a necessary precondition for export, but also use pre-accession funds, including making available soft lending to investment in livestock production, encourage efficient forms of cooperation between producers, feed industry for poultry and processing industries and in that sense, support the establishment of agricultural chambers, which would bring together representatives of all sectors in the chain and allow the establishment of rules and agreements in the field of production and market agricultural products; Establishing laboratories for testing the quality of meat, an increase of work on prevention and combating of infectious diseases in order for BiH to obtain a license for the export of products of animal origin.

## **Summary in Serbian**

### **ТРЕНДОВИ У ПРОИЗВОДЊА И ПРЕРАДИ МЕСА У РЕПУБЛИЦИ СРПСКОЈ**

Један од стратешких циљева економске политике сваке земље је унапређење производње хране, како би се постигли виши нивои самодовољности у прехранбеним потребама. Из тога проистиче да је производња меса веома важан ресурс за производњу хране, тако да се тој производњи треба дати адекватна правна и институционална подршка. У Републици Српској (Ентитет Босне и Херцеговине), сточарство, а нарочито узгој говеда и оваца, имају дугу традицију. Потенцијал за развој сточарства је велик, узимајући у обзир расположиве капацитете земљишта. С друге стране, потрошња протеина животињског порекла расте пропорционално са повећањем животног стандарда. Потрошња ове врсте протеина у ЕУ је два пута већа од светског просека, и има тренд пораста због раста животног стандарда, проширења ЕУ и повећања популације. Земље ЕУ не могу да задовоље потребе протеина

животињског порекла из сопствених извора. Земље ЕУ се такође удаљавају од стратегије даљег интензивирања производње анималних производа, јер би то значило још већи притисак на одрживо кориштење земљишних ресурса, биодиверзитет и квалитет и безбедност производа, а то није оно што европски произвођачи сада желе. Ова ситуација ствара простор за произвођаче из РС да створе залихе за европско тржиште. Циљ овог рада је да покаже могућности и трендове у производњи меса у Републици Српској, као и спремност овог дела привреде РС да се такмиче на европском тржишту.

Аутори су користили метод упоредне анализе за посматрање обима сточарске производње и производње меса у РС у периоду 2005-2011. Анализирани су трендови раста броја стоке, као и количине произведеног меса, израчунату на основу базног индекса, са 2005 као базном годином. Као извори података коришћене су званичне публикације Завода за статистику. Ниво трговинског биланса је анализиран преко вредности спољне трговине, увоза и извоза за период 2005-2009, период за који су подаци били доступни. Подаци су узети из званичних публикација Спољнотрговинске коморе БиХ и односе се на БиХ као земљу, с обзиром да је спољнотрговинска размена у Босни и Херцеговини у надлежности државе, а не ентитета.

Резултати истраживања показују да се значај развоја сточарства огледа у чињеници да преживари искориштавају површине под природним травњацима (ливаде и пашњаци), које у структури пољопривредног земљишта покривају око 36% укупних површина. Према индексима производње у односу на базну годину 2005, можемо закључити да су све врсте стоке, осим свиња имале позитивну вредност индекса. Просечан раст у производњи стоке у односу на 2005 био је 8,89% годишње, са највишим вредностима у 2006 и најнижим у 2008. Производња оваца имала је просечан раст од 25,29% годишње, са највишим вредностима у 2010, а најнижим у 2006. Производња свиња није достигла ниво производње из 2005, а просечан индекс у односу на ову годину био је само 83,17%. Најнижи индекс забиљежен је у 2008 када је укупна производња пала на 69,37% нивоа производње у 2005. Живинарска производња је, имала највећи раст, са просечном годишњом стопом од 66,14%. Највећа вредност у живинарској производњи је постигнута у 2010, са преко 200% раста индекса у односу на 2005, али у 2011 је овај индекс опао за 30%.

С друге стране, неуспех у увођењу основних стандарда безбедности, неправилна организација набавке, неконзистентност квалитета, недостатак знања о страним тржиштима, само су неки од разлога зашто је потенцијал за извоз, који постоји у овом сектору, неискориштен.

Дакле, постоји потреба да се повећа производња стоке кроз: бољу организацију тога у смислу усклађености капацитета примарне и секундарне производње, побољшање квалитета производње, посебно у погледу обезбеђивања континуитета и нивоа квалитета, побољшање стања у производњи меса и преради кроз увођење економских мера, које се јављају као неопходан предуслов за извоз, али и искориштавање претприступних фондова, укључујући стављање на располагање кредитирање инвестиција у сточарској производњи, подстицање ефикасних облика сарадње између примарних произвођача, произвођача сточне хране и индустрије за прераду. У том смислу, треба подржавати оснивање пољопривредних комора, које ће окупити представнике свих сектора у ланцу и омогућити успостављање правила и споразума у области производње и тржишта пољопривредних производа; успостављање лабораторија за испитивање квалитета меса, повећање рада на превенцији и борби против заразних болести у циљу да БиХ добије дозволу за извоз производа животињског порекла.

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**METHODOLOGY ENHANCEMENTS OF THE EDUCATIONAL  
PROCESS IN DSP PROGRAMMING COURSE**

**UNAPREĐENJE METODOLOGIJA EDUKACIONOG PROCESA U  
KURSU DSP PROGRAMIRANJA**

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## **UNAPREĐENJE METODOLOGIJA EDUKACIONOG PROCESA U KURSU DSP PROGRAMIRANJA**

### **METHODOLOGY ENHANCEMENTS OF THE EDUCATIONAL PROCESS IN DSP PROGRAMMING COURSE**

**Keywords:**

educational tool, simulation of DSP filters, interactive framework

**Abstract:**

This paper presents a practical solution for interaction between students and software/hardware systems in education. The development of science and the technology allowed significant enhancements to the methods in presentation of new materials to students. The main purpose of this research was for the students to gain some basic insight into elementary techniques needed for design, implementation and merging of hardware and software components used in testing of the algorithms for digital signal processing in real time. Main goal was to develop Digital Signal Blocks (DSP) which would be used as intuitive bridge between students and DSP systems by eliminating obscure software interface. Over the years it was established that students waste the majority of their time in classes on adopting software interface which leaves them with very little time to master the key principles in the curriculum. This is especially true in the case of the embedded systems because there students must learn to work with several software packets. The developed software system allows students to concentrate on just one graphical interface which is intended to handle every aspect of embedded system design – from algorithm simulation to the hardware implementation. Through the work with the students it was concluded that the developed DSP blocks presented very good assistance in educational process. Since real hardware systems were used in this case noise was introduced in the system which does not exist in simulation software and therefore this option produced much larger capabilities for development of the robust algorithms. The advantage of this approach lies in the fact that the anchor point in education was transferred from the mere observation of the lecture presentation to the active participation in the aggregation of the new material.

**Ključne reči:**

alati u edukaciji, simulacija DSP filtara, interaktivni framework

**Sažetak:**

U ovom radu je predstavljeno praktično rešenje za interakciju studenata sa softverskim-hardverskim sistemima u edukaciji. Razvoj nauke i tehnologije je omogućio značajne pomake u unapređenju metoda prezentovanja gradiva studentima. Glavni cilj ovog rada je bio da se omogući studentima da ostvare dublji uvid u elementarne tehnike potrebne za dizajniranje, implementaciju i ostvarivanje sinergije između softverskih i hardverskih komponenti korišćenih u testiranju algoritama za digitalnu obradu signala u realnom vremenu. Naglasak je stavljen na razvoj digitalnih signalnih blokova koji služe kao intuitivna sprega između studenata i DSP sistema putem eliminacije bilo kakvog komplikovanog interfejsa. Tokom godina je zaključeno da studenti gube većinu vremena na savladavanje korisničkog interfejsa nakon čega im ostaje mnogo manje vremena za savladavanje ključnih delova gradiva. Ovo pogotovo važi u slučaju ugrađenih hardverskih sistema iz razloga što je potrebno savladati više različitih softverskih paketa. Razvijeni softverski sistem omogućava studentima da se koncentrišu samo na jedan grafički interfejs koji je projektovan da adresira sve aspekte projektovanja ugrađenih sistema – od simulacije algoritama do hardverske implementacije. Kroz rad sa studentima je zaključeno da razvijeni DSP blokovi predstavljaju veoma dobru ispomoć u edukacionom procesu. Pošto su se za izvođenje nastave koristili fizički hardverski sistemi u testiranje su bile uključene i smetnje iz stvarnog sveta što je rezultiralo dobijanjem robusnih algoritama. Glavna prednost ovakvog pristupa leži u činjenici da je težište u edukacionom procesu premešteno iz pukog prisustva prezentaciji gradiva na aktivno učešće u savladavanju nove materije.

## **UVODNO RAZMATRANJE / INTRODUCTION**

Trenutno dostupni razvojni DSP sistemi ne zadovoljavaju u potpunosti današnje stroge i robusne zahteve, posebno u svetlu drugačijeg profila studenata novih generacija. Na polju digitalne obrade signala, primenjene metode ne mogu zadovoljiti sve veće i kompleksnije zadatke. Iz ovih razloga je potrebno razviti nove metode, gde se stavlja naglasak na sve brži razvoj i na brže rešavanje problema. Ovde je predstavljeno rešenje u vidu izgradnje interaktivnog sistema, gde je podržan razvoj na višem programerskom nivou.

Metoda interaktivnog razvoja u realnom vremenu u digitalnoj obradi ima brojne prednosti kod razvoja aplikacije. Ubrzava se razvojni tok baš iz razloga što je u ranoj fazi moguće testiranje algoritma filtra, poređenje sa realnim fizičkim DSP sistemima, kao i korekcija eventualnih nedostataka. Integracija u već postojeći razvojni alat (MATLAB) olakšava primenu ove razvojne metode, a njeno integrisanje u jednostavno grafičko okruženje omogućuje koncentrisanje na probleme i algoritme DSP umesto na sam programski jezik.

Pomoću softverskih komponenti se implementacija dešava na višem nivou bazirajući se na već postojećim komponentama. Arhitektura softverskog okruženja dolazi do stvarnog izražaja kod izgradnje specifikacije za implementaciju algoritma. Implementacija se vrši na osnovu blok dijagrama samog algoritama. Primenom softverskog okruženja, programer se udaljava od klasičnog programiranja koje je blisko hardveru, razvijen softver se izvršava u softverskom okruženju potpuno nezavisno od hardvera.

Veoma bitna stvar kod svake tehnologije je standardizacija. To znači uvođenje protokola za komunikaciju. Definisanjem ovakvog protokola za sve osnovne DSP komponente razmena informacija između DSP komponenti u MATLAB-u bi postala veoma uprošćena i jednostavna, čime bi došlo do značajnog smanjenja grešaka pri konstruisanju složenih DSP komponenti od strane korisnika.

Pošto većina ljudi informacije najlakše tumači ako su prezentovane u vizuelnoj formi logično je bilo razviti alate za grafički prikaz koji bi obuhvatali najvažnije oblasti kao što su: kontroler, protok podataka i procesiranje podataka.

## **CILJEVI I METODE / OBJECTIVES AND METHODS**

Komercijalno dostupni softverski paketi iz DSP oblasti podrazumevaju da korisnik već raspolaže određenim znanjem, a ne da pokušava da usvoji osnovne principe iz neke oblasti. Pored ovoga proizvođači, kao npr. Texas Instruments, izdaju softver koji se može koristiti

samo sa određenom familijom procesora i ne mogu se upotrebiti za razmatranje uopštenih slučajeva. Tokom primene softverskih paketa MATLAB i Code Composer Studio na Visokoj tehničkoj školi strukovnih studija u Subotici primećeno je da studenti imaju više problema pri navikavanju na rad u programskim paketima nego sa usvajanjem osnovnih teorijskih principa iz razmatranih oblasti obrade signala.

Stvaranjem jednog DSL opisnog jezika oblast se može razdvojiti na projektovanje specifičnog dela (obrada signala) i dela za realizaciju (hardver, softver). Opisni jezik omogućava da stručnjaci iz date oblasti razvijaju samo algoritme. Prednost ovog načina razvoja je da se za kraće vreme razvijaju kvalitetni algoritmi i robusna realizacija.

Polazeći od hipoteze istraživanja da je razmatranje, razvoj i testiranje algoritama za filtriranje niskofrekventnih signala u realnom vremenu uglavnom rađeno u simulacionom okruženju, treba naglasiti da rezultati simulacije po pravilu ne sadrže karakteristične granice realnog sistema. Zato je potrebna realizacija takvog sistema koji obezbeđuje efektivno testiranje algoritama za digitalnu obradu niskofrekventnih signala u realnom okruženju i realnom vremenu.

Upravo je ovde primećen problem u edukaciji određene kategorije studenata. Naime, studenti gotovo da nemaju dodira sa praktičnim analizama i testiranjima algoritama za obradu signala na fizičkim platformama, pa se stoga javlja potreba za uvođenjem sistema koji bi objedinio i simulacione i praktične alate kako bi se ostvarilo što intuitivnije i po mogućnosti interaktivno usvajanje znanja kod studenata.

Pri radu na fizičkim DSP platformama javlja se šum koji sam hardver unosi u signal. Pod time se podrazumeva šum u analognom delu štampane ploče i šum koji unosi sam A/D konvertor. U zavisnosti od korišćenih komponenti može se javiti šum različite raspodele (beli šum, šum usled neadekvatnog povezivanja sa audio opremom itd.). Takođe kvalitet komponenti i kvalitet izrade štampane ploče ima presudnu ulogu kod nivoa prisutnog šuma. Zbog ovakvog „realnog“ okruženja simulacioni softveri ne mogu da u potpunosti prikažu uticaj šuma na korisni signal. Takođe veliki problem kod simuliranog šuma leži u činjenici da je šum koji će se javiti na fizičkoj štampanoj pločici nepoznat, tako da bi razvijeni algoritam mogao da bude neefikasan ako je izvršena pogrešna pretpostavka o vrsti i nivou šuma. Robustan algoritam je onaj čija je funkcija neosetljiva u odnosu na šumove iz određenog unapred zadanog opsega vrednosti.

Upravo iz tih razloga je postavljen cilj interaktivnog načina projektovanja filtera za digitalnu obradu niskofrekventnih signala u radu sa studentima. Interaktivni rad podrazumeva zadavanje ulaznog signala u razvijeni algoritam i posmatranje odziva koji daje

hardverska DSP platforma. Na taj način studenti dobijaju direktnu informaciju o uticaju algoritma na signal kao i o nivou i obliku šuma na testiranoj platformi.

Cilj istraživanja je projektovanje specifičnog programskog jezika za digitalnu obradu signala, čija bi primarna namena bila efikasno upućivanje studenata u osnovne koncepte digitalne obrade signala na stvarnim hardverskim platformama. Da bi se obezbedila maksimalna upotrebljivost projektovanog opisnog jezika korišćene su metode objektno orijentisanog programiranja kao i grafički prikaz osnovnih gradivnih struktura koje se koriste u projektovanju krajnjeg sistema. Izabrani grafički elementi opisnog jezika u ogromnoj meri olakšavaju projektovanje algoritama i u isto vreme značajno smanjuju mogućnost nastajanja greške pri projektovanju. Još jedna velika prednost grafičkog prikaza elemenata se ogleda u lakoći spajanja jednostavnijih elemenata u kompleksne sisteme u odnosu na klasične programske metode.

Razvijeni sistem predstavlja spregu hardvera i softvera čija je primarna namena unapređenje usvajanja znanja i veština kod studenata pri proračunu i implementaciji DSP rešenja u digitalnoj obradi signala, pa je radi lakšeg razumevanja ciljeva rada prikazana funkcionalna šema projektovanog sistema kroz primer izvođenja rada sa studentima, slika 1. Pored toga, dat je ukratko opis jedne laboratorijske vežbe iz predmeta "Obrada zvuka". Cilj vežbe je da se studentima demonstrira delovanje projektovanog filtra na audio signal. Vežba je podeljena na pet delova:

1. Projektovanje filtra sa unapred zadatim parametrima.
2. Testiranje uticaja filtra na audio signal u simulatoru (audio signal je obezbeđen u vidu unapred generisanog binarnog fajla).
3. Testiranje uticaja filtra na audio signal u koji je unešen šum u simulatoru (signal koji predstavlja mešavinu audio signala i šuma je obezbeđen u vidu unapred generisanog fajla).
4. Testiranje uticaja filtra na audio signal na fizičkoj DSP platformi (audio signal je obezbeđen preko audio generatora koji je priključen na audio ulaz DSP razvojne ploče).
5. Testiranje uticaja filtra na audio signal na fizičkoj DSP platformi u koji je uključen šum (audio signal je obezbeđen preko audio generatora koji je priključen na audio ulaz DSP razvojne ploče, a šum je obezbeđen preko generatora belog šuma koji je priključen na drugi audio ulaz DSP razvojne ploče; mešanje audio signala i šuma se vrši unutar samog DSP procesora nakon A/D konverzije (Analog to Digital Conversion)).

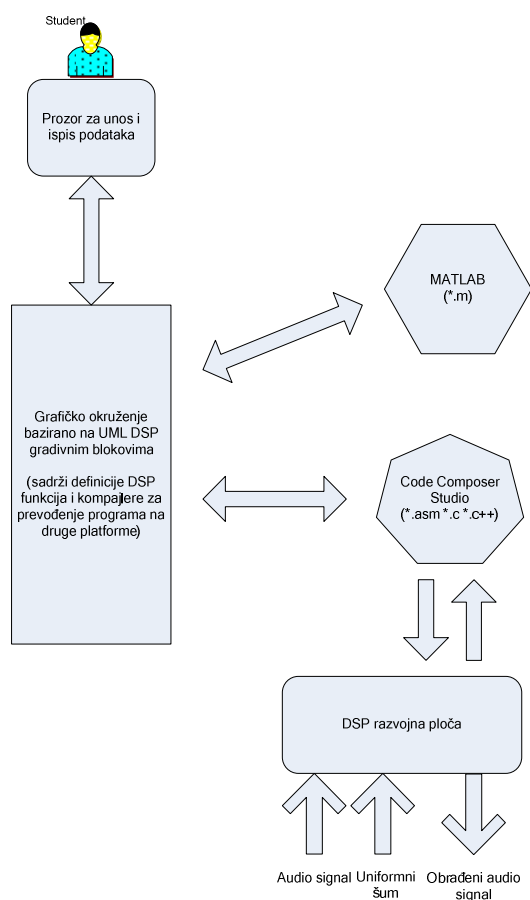
Glavna prednost ovakvog koncepta rada leži u činjenici da se student koncentriše samo na jedan prilagođen programski alat, pa ne mora da odvajati vreme na savladavanje više programskih paketa nego se može koncentrisati na usvajanje demonstriranih principa iz nastavnog gradiva. Na ovaj način smanjuje se opterećenje i studenta i predavača čime se podiže efikasnost u nastavi, što je od posebnog značaja kada je reč o relativno malom obimu nastave i ograničenom predznanju studenata koji treba da savladaju samo osnovne principe i koncepte obrade signala.

Pri obrazovanju u oblasti DSP veoma je bitna mogućnost komparacije rezultata simulacije i rezultata dobijenih na fizičkom hardveru. Tako je moguće odmah steći praktično iskustvo vezano za implementaciju teorijskih proračuna na realnim DSP sistemima (npr. razlika u rezultatu ako se primenjuje 8 bitna aritmetika ili 32 bitna aritmetika za realizaciju koeficijenata filtra). Tako studenti stiču dublji uvid u principe praktičnog funkcionisanja algoritama za obradu signala jer pri izvođenju proračunatih formula u simulacionim softverskim paketima softver koristi 32 bitnu ili čak 64 bitnu preciznost sa pokretnim zarezom, pa se ne mogu lako uočiti problemi ograničene preciznosti na realnim DSP sistemima. Takođe, pri radu sa fizičkim DSP procesorima uglavnom su na raspolaganju 16 bitni registri koji podržavaju samo celobrojne matematičke operacije tako da studenti mogu da vide direktan uticaj zaokruživanja rezultata matematičkih operacija primenjenih na digitalni signal.

Razvijeni softver razvijen podržava i mogućnost smanjivanja rezolucije. Iako DSP hardver podržava npr. 16 bitne operacije, softver može da koristi samo prvih 8 bita čime se od 16 bitnog procesora veštački stvara 8 bitni. Na ovaj način studentima se pruža mogućnost da lako izvrše uporedni pregled funkcije odziva, polova, nula itd, za projektovane filtre u 8, 12, 16 i 32 bitnoj rezoluciji. Ovakav vid direktne edukacije osposobljava studente da predvide i praktično provere ponašanje proračunatih filtara na fizičkom hardveru čija preciznost u izvođenju matematičkih operacija je daleko niža od one koja se može ostvariti na simulacionom softveru na personalnim računarima.

Kao što se iz prethodnog teksta može videti cilj projektovanog sistema nije bio da zameni postojeće široko rasprostranjene programske pakete, nego da omogući korišćenje više programskih paketa kroz objedinjeni grafički interfejs čiji je osnovni zadatak da generiše određene DSP algoritme i prikazuje rezultate primene tih algoritama u simulacionim i fizičkim okruženjima sa audio i video signalima.

Slika 1: Generalni pregled realizovanog sistema



Pregledom teksta vežbe mogu se izvući zaključci o izvođenju edukativnog procesa. Na prvi pogled se vidi da u nekim segmentima dolazi do drastičnog odstupanja od tradicionalnih metoda predavanja. Naime pri pisanju stručne literature uvek se stavlja akcenat na sažetost, konciznost i preciznost izložene materije. Autori ovog rada se u potpunosti slažu sa takvom praksom koja se u mnogobrojnoj literaturi zalaže za ovakav pristup izlaganja materije, ali samo u slučaju da je ta literatura namenjena čitaocima koji su već upućeni u osnove posmatrane naučne oblasti i sada teže da unaprede svoje postojeće znanje. U komunikaciji sa studentima utvrđeno je da su osobine kao što su sažetost, neponavljanje i ravnomerna zastupljenost u izloženom materijalu vrlo često veoma štetne po pitanju brzine usvajanja gradiva. Jedan od velikih problema na koji su se studenti žalili je velika teškoća da se odrede bitni segmenti gradiva koji predstavljaju osnovu koju prvo treba identifikovati i usvojiti, a tek nakon toga preći na razumevanje ostatka gradiva. Naime ako se dosledno poštuju principi sažetosti i konciznosti tada će, da ne bi bilo “nepotrebnog” ponavljanja, i najvažnija osobina i najmanje važna osobina dobiti otprilike istu količinu prostora u materiji. Ovo je čak poželjno kada čitalac ima dovoljnu količinu predznanja da ne

bi došlo do zbunjivanja ili nepotrebnog gubljenja vremena, ali iz rada sa studentima je utvrđeno da je takav način rada uglavnom štetan u edukativnom procesu. Stoga je zaključeno da je potrebno što češće uključivati najvažnije pojmove i principe u izvođenje vežbe kako bi studenti što lakše mogli da zaključe koji su pojmovi i principi ključni za razumevanje gradiva. U praksi ovo je postignuto čestim ponavljanjem određenih principa i zadataka prilikom izvođenja laboratorijske vežbe kako bi se kod studenata stvorila rutina vezana za ključne momente u gradivu.

Na prethodnoj slici je prikazano da je za simulaciju korišćen programski paket MATLAB (Matrix Laboratory), dok je kod hardverske implementacije korišćen Code Composer Studio. Bitno je napomenuti da korisnik nije svestan postojanja ovih programa. Oni se ovde koriste u funkciji unutrašnjih modula i kao takvi se mogu zameniti drugim modulima. Npr. u slučaju korišćenja hardvera drugog proizvođača bilo bi potrebno promeniti međukompajler, a što se tiče simulacije mogu se koristiti drugi matematički programi kao što je npr. Octave.

Matlab predstavlja crnu kutiju koja prima ulazne numeričke podatke i daje izlazne numeričke podatke prema nekoj funkciji. Praktično je moguće napisati grafičko okruženje u Matlabu koje bi prikazivalo rezultate obrade digitalnih signala, ali bi to značilo uvođenje dva velika problema:

- Takav grafički sistem bi se morao projektovati i realizovati, a zatim bi se studenti morali prvo obučavati kako da ga koriste pre nego što bi mogli da pristupe radu na laboratorijskim vežbama što bi oduzimalo puno vremena koje bi se moglo iskoristiti za izlaganje gradiva
- Takav sistem ne bi rešio povezivanje sa hardverom, pa bi se dodatno vreme moralo trošiti na upoznavanje dodatnih programskih paketa koji nemaju nikakvih zajedničkih tačaka sa Matlabom (npr. Code Composer Studio).

Iz izloženog se vidi potreba za programom koji bi se bazirao u što većoj meri na savladavanju bitnih principa iz gradiva, a ne na upoznavanje programskih interfejsa raznih softverskih paketa.

Po pravilu, elementi koji čine ovakav sistem (softver) mogu se podeliti na dve grupe: radni okvir (framework) i njegovi dodaci. Dakle, u osnovi je framework koji se može proširivati jedinicama koje mogu da naprave korisnici u skladu sa svojim ciljevima i potrebama. Jedan od glavnih zadataka framework-a je da obezbedi nezavisnost softvera i hardvera, tj. da obezbedi podršku za više hardverskih platformi bez potrebe da korisnik



menja framework ili način programiranja. Ovo u stvari znači da razvijeni programski paket pristupa implementaciji algoritma sa apstraktnog nivoa, dok fizičku implementaciju opisanog algoritma vrši kompajler za datu hardversku platformu. Arhitektura framework-a je po pravilu objektno orijentisana i implementirana je u ANSI C programskom jeziku. Osnovna funkcionalnost framework-a se može proširiti pomoću softverskih dodataka. Dodatke možemo uklopiti sa osnovom samo u obliku kompatibilnih komponenti. Na kraju, funkcionalnost celog sistema zavisi od primenjenih softverskih jedinica (modula). Dakle, framework sadrži samo osnovne module koji potpomažu algoritme, tj. omogućuju razvoj dopunskih jedinica koje se mogu dalje podeliti u dve velike grupe: (1) jedinice za obradu podataka i (2) jedinice za vršenje upravljačkih funkcija koje mogu promeniti redosled obrade podataka.

Cilj interaktivnog razvojnog sistema u realnom vremenu je provera toka razvoja i rada elemenata koji sačinjavaju sistem na ciljnom procesoru i mogućnost upoređivanja rezultata sa simulacionom rezultatima. Tako dobijena metoda se može primeniti u interaktivnom razvoju obezbeđivši postepenu proveru i integraciju.

Razvojni sistem je dizajniran za razvoj aplikacija za digitalnu obradu signala, mada se može slobodno proširivati i koristiti na drugim poljima isto tako efektivno, kao npr. za pisanje tehničke dokumentacije gde se može upotrebiti UML struktura razvijena u programskom paketu. Aplikacije za digitalnu obradu signala su procesorski veoma zahtevne i tačnosti proračuna su od izuzetno velikog značaja. Kao primer možemo uzeti FIR (Finite Impulse Response) filter. Dizajniranje i vrednovanje filtra možemo izvršiti u MATLAB programskom paketu. Na osnovu dobijenog rezultata možemo doći do zaključka da projektovani filter vrši željeni zadatak. Sa razvojnim sistemom se proverava već tokom samog razvoja da li se i na ciljnom procesoru filter ponaša kao u simulaciji. Korišćenjem razvojnog sistema se ispituje da li se poklapaju karakteristike projektovanog filtra u MATLAB programskom paketu i karakteristike filtra na ciljnom procesoru. Dobijeni rezultati se razlikuju pošto ciljni procesor drugačije skladišti koeficijente i drugačije vrši aritmetičke operacije. Ovaj problem se lako može otkriti i korigovati korišćenjem razvojnog sistema već u ranoj fazi razvoja.

Modelovanje koje se koristi u razvojnom sistemu je veoma efektivno za razvoj i testiranje algoritama, iz razloga što se projektovani UML dijagram lako implementira u softver kao pipeline za obradu gde se koraci poklapaju sa koracima koji su naznačeni u UML dijagramu. Modifikacije izvršene na UML dijagramu trenutno se ogledaju na

pipeline-u za obradu. Prednosti ove metode su razvoj i testiranje algoritama na visokom nivou i dobijanje rezultata iz realnog okruženja.

Metoda interaktivnog razvoja u realnom vremenu u digitalnoj obradi ima brojne prednosti kod razvoja aplikacija. Ubrzava se razvojni tok baš iz razloga što je u ranoj fazi moguće testiranje algoritma filtra, kao i korekcija eventualnih nedostataka. Integracija u već postojeći razvojni alat (MATLAB) olakšava primenu ove razvojne metode.

## REZULTATI / RESULTS

Kao mera za ocenjivanje uticaja na unapređenje savlađivanja izložene materije koristi se prosek ocena iz školskih 2006/2007 i 2007/2008 godina, kada nije izvođen eksperiment, kao i prosek iz školskih 2008/2009 i 2009/2010 godina u kojima je izvođen eksperiment.

Pošto broj studenata na Visokoj tehničkoj školi strukovnih studija u Subotici retko prelazi cifru od 30 studenata po smeru, odlučeno je da se studenti ne dele na dve testne grupe, već da se programski paket primeni na celu generaciju studenata u toj školskoj godini. Analiza se zatim vršila u odnosu na prosečnu ocenu studenata iz prethodne generacije. Kao dodatna “kontrolna grupa” korišćene su prosečne ocene istih studenata iz bliskog predmeta na kojem se nije menjao koncept nastave primenom ovako prilagođenih softverskih alata i metoda, što je dato kao dodatna referenca u tabeli 2 gde su predstavljene ocene studenata u istom periodu iz predmeta Digitalna obrada signala. Upoređenjem te dve tabele jasno se vidi da nije došlo do sličnih unapređenja proseka studenata iz predmeta Digitalna obrada signala. Ovime se potvrđuje da je napredak studenata iz predmeta Digitalna obrada zvuka i slike rezultat unapređenja izvršenih u edukacionom procesu.

**Tabela 1** Povećanje proseka ocena studenata koji su u eksperimentima koristili razvijeni sistem na predmetu Digitalna obrada zvuka i slike

Školska godina	Prosek	Eksperiment
2006/2007	7,08	ne
2007/2008	7,05	ne
2008/2009	7,58	da
2009/2010	7,74	da

**Tabela 2** Referentni prosek iz predmeta Digitalna obrada signala

Školska godina	Prosek
2006/2007	6,63
2007/2008	6,89
2008/2009	6,71
2009/2010	7,02

Analizom rezultata iz Tabele 1 jasno se vidi da je došlo do značajnijeg povećanja proseka ocena studenata u godinama kada je korišćen softverski paket. Uspešnost primenjenog softverskog paketa je evidentna zato što su svi upisani studenti tih školskih godina pristali da učestvuju u eksperimentu. Studenti ranijih godina, pre eksperimenta su u nastavi koristili programski paket MATLAB i programski paket Code Composer Studio.

Kao dodatni podatak u prilog uspešne primene razvijenog obrazovnog softvera može da posluži podatak da na drugim predmetima nije zabeležen ovakav napredak u prosečnoj oceni istih studenata.

Eksperiment je izveden u laboratorijama Visoke tehničke škole strukovnih studija u Subotici u trajanju od dve godine. Eksperiment je izvođen sa studentima treće godine elektro i informatičkog smera iz predmeta Obrada zvuka i slike. Proučavanjem literature vezane za edukacione alate primećeno je da ispitivanja i potvrda rezultata nisu rađeni u saradnji sa studentima i nisu se bazirala na nekim konkretnim merenjima. Pošto usvajanje gradiva od strane studenata u velikoj meri zavisi od njihove motivisanosti i inspirisanosti metodama predavanja odlučeno je da se sprovede anketa među studentima koji učestvuju u sprovođenju eksperimenta radi utvrđivanja uticaja eksperimenta na studente i njihovo interesovanje za predmet.

Pošto nije došlo do izmene nastavnog plana i programa iz posmatranog predmeta, a sa obzirom da su grupe studenata male prosek ocena iz školskih godina pre izvođenja eksperimenta se uzima kao kontrolna grupa.

Važno je napomenuti da učešće studenata nije bilo obavezno kao i da učešće u eksperimentu nije donosilo nikakve dodatne bodove na ispitu iz predmeta. Razvijeni softverski paket se nije koristio u ispitivanju studenata.

Studenti su bili anketirani pre i posle korišćenja softverskog paketa. Svaki student je popunio anketu čiji rezultati su prikazani u Tabeli 3. Podaci predstavljeni u tabeli su prikupljeni u periodu od dve godine, 2008 i 2009. Ukupan broj studenata koji su učestvovali u testiranju je 149. Analizom odgovora studenata utvrđeno je da je softverski paket

pozitivno uticao na unapređenje znanja studenata. Ovaj vizuelni i interaktivni alat nije samo povećao brzinu usvajanja znanja kod studenata nego je takođe imao veliki uticaj na podizanje interesovanja studenata na za datu oblast.

Analizom ankete utvrđen je pozitivan uticaj na motivisanost studenata za materiju iz predmeta Obrada zvuka i slike. Važno je napomenuti da anketa ne predstavlja praktično merilo uspešnosti korišćenog edukacionog alata već daje uvid u prihvaćenost razvijene metode u redovima studenata.

**Tabela 3** Rezultati ankete

Pitanje	Veoma dobro	Dobro	Delimično	Malo
Oceni svoje poznavanje digitalnih filtara pre pohađanja ovih vežbi!	2	9	59	79
Da li si razumeo matematičke modele filtara pre pohađanja ovih vežbi?	8	43	69	29
Da li te je alat motivisao za rad na vežbama?	38	51	37	23
Koliko je tvoje iskustvo vezano za projektovanje digitalnih filtara pre pohađanja vežbi?	51	35	52	11
Da li su se eksperimenti na vežbama nadovezali na tvoje prethodno znanje iz oblasti digitalnih filtara?	15	80	39	15
Da li je alat lak za korišćenje sa intuitivnim interfejsom?	68	55	24	2
Koliko je, po tvom mišljenju, ovaj alat doprineo tvom savladavanju materije?	80	48	14	7
Kako ocenjuješ svoj rad sa ovim alatom u pogledu lakoće korišćenja i unapređenja tvog znanja?	94	36	14	5
Da li su eksperimenti na vežbama predstavljali demonstraciju principa utvrđenih na teorijskoj nastavi?	62	59	24	4

Postavka hardvera: na slici 2 je predstavljen hardver korišćen u laboratoriji.

Kutija sa desne strane je signal generator koji je preko crvene žice povezan sa ulaznim portom DSP razvojnog okruženja. U kutiji u sredini se nalazi DSK razvojna ploča. Izlazni port iz DSK ploče je preko plave žice povezan sa zvučnicima.

**Slika 2** Postavka hardvera



## **DISKUSIJA / DISCUSSION**

Postoje razna istraživanja u vezi sa realizacijom razvojnog okruženja za digitalnu obradu niskofrekventnih signala koja omogućavaju promenu parametara tokom rada. Nedostaci ovakvih rešenja su složena implementacija u već postojeća rešenja, tj. u većini slučajeva se radi o zasebnim aplikacijama koje dokazuju samo jednu zasebnu tvrdnju i nisu predviđena da se povezuju sa drugim programskim paketima radi postizanja boljih rezultata ili proširenja oblasti primene.

Oblasno specifični (Domain Specific) jezici se sve češće primenjuju, ali u polju digitalne obrade signala nije raširena njihova upotreba. Ukazuje se potreba za jednim takvim modernim oblasno specifičnim jezikom, koji bi generalno mogao da se koristi na polju DSP razvoja i koji bi nezavisno od oblasti olakšavao rad istraživača.

Iako su DSL jezici sve zastupljeniji u mnogim oblastima, u digitalnoj obradi signala još uvek nisu postali standard. Samim tim u najvećem broju slučajeva ulaže se energija u definisanje i razvoj sintakse i semantike jezika. Zbog toga je većina razvijenih jezika još uvek bazirana na tekstualnom zadavanju komandi koje se uglavnom specificiraju za rešavanje pojedinačnih zadataka u obradi signala [1], [2]. Ovo čini rešavanje jednostavnih zadataka prilično lakim, ali onemogućava konstruisanje kompleksnih sistema na lak i

intuitivan način. Postojeći jezici su tekstualno orijentisani i uglavnom bazirani na objektno orijentisanim metodama. Glavna preokupacija se u većini slučajeva svodi na rešavanje specifičnih problema, a ne na definisanje osnovnih gradivnih blokova koji lako mogu da se kombinuju u složenije algoritme [3], [4]. Najveći broj razvijenih programskih paketa koristi simulacije za proveru svojih rezultata dok je analiza na hardveru u realnom vremenu zapostavljena [5], [6]. Analizom postojećeg stanja u ovoj oblasti došlo se do zaključka da postoji prostor za razvoj DSL jezika na bazi grafičkih gradivnih elemenata čija bi namena bila što lakše i intuitivnije spajanje u kompleksnije algoritme sa mogućnošću testiranja performansi na realnim platformama.

Nakon proučavanja dostupne literature [7] izabran je UML kao pogodna opcija za modelovanje iz sledećih razloga:

- UML je prepoznat kao standard i postao je veoma zastupljen u industriji
- UML poseduje mehanizme za proširenje (stereotipovi, obeležene vrednosti, napredne provere opsega itd) što znači da je dozvoljeno projektovanje dodatne semantike koja se lako može integrisati u postojeći UML
- UML se modeluje preko mehanizma metamodela što dozvoljava da se definiše metamodel koji može da nadogradi postojeći UML u slučaju potrebe
- Korišćenjem objektno orijentisanog pristupa u UML-u definisanje klase se vrši preko interfejsa klase i ponašanja (behaviour) klase. Ovakvo razdvajanje između definicije i instance klase dozvoljava razvoj biblioteka sa ponovno upotrebljivim (re-usable) komponentama. Dodatna prednost objektno orijentisanog pristupa je sposobnost da se definiše nova komponenta preko nasleđivanja osobina iz druge komponente što opet unapređuje mogućnost ponovnog korišćenja (re-use) postojećih komponenti.

Nadalje, UML ne zavisi od neke posebne metodologije pa se može definisati sopstvena metodologija koja najviše odgovara rešavanju postavljenog problema. Drugi projekti u oblasti sistema u realnom vremenu ili ugrađenih (embedded) sistema su takođe izabrali UML kao jezik za modelovanje. Npr. HASOC metodologija [8] proširuje UML-RT kako bi se uključila anotacija sa mapiranim informacijama. U tom radu autori su predložili povezivanje kapsula sa dodatnim osobinama kao što su sinhroni protok podataka i kodirane mašine stanja. Druga istraživačka grupa je predložila UML profil za ugrađene sisteme [9], koji olakšava modelovanje hardverske platforme i kvantifikovanje QoS (Quality of Service) performansi.

## ZAKLJUČAK / CONCLUSION

Zbog svoje interaktivne i grafičke prirode ovo softversko okruženje je dobar kandidat za aplikacije u edukativnim kursevima iz oblasti digitalne obrade signala. Pokazalo se da je pre korišćenja ovog alata studentima dovoljno dva časa teorijskih predavanja i dva časa uvodne nastave u računarskoj laboratoriji.

Korišćenjem ovog softverskog okruženja studentima se omogućuje efikasno:

- razumevanje osnovnih principa FIR i IIR filtara
- povezivanje parametara filtara sa realnim kolom
- izvođenje praktičnih eksperimenata u laboratoriji
- projektovanje praktičnog filtara prema proračunatim teorijskim modelima
- unapređenje znanja iz oblasti digitalne obrade signala u što kraćem vremenu.

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**Kratak izvod**

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**MODEL**

**MULTIFUNKCIONALNOG RAZVOJA PODRUČJA OPŠTINE  
ARILJE– R. SRBIJA**

**MODEL**

**OF MULTIFUNCTIONAL DEVELOPMENT OF THE COMMUNITY  
ARILJE**

**Key words:**

rural areas, multifunctional agriculture, rural development.

**Abstract:**

Short introduction to the doctoral thesis of Vojislav Simanović elaborated under the mentoring of Prof. Dr. Nebojša Novković, regular professor of the Faculty of Agriculture in Novi Sad. The thesis was successfully defended on February 24, 2012.

The aim of the dissertation research is that through scientific description, analysis of the condition and quality of the available economic potential in Serbian rural areas defines effective model and measures (strategies) for the structural adjustment to multifunctional and sustainable development of rural areas of Serbia, which contribute to economic and social progress. In order to test the general model, based on the same principles (analysis of potential and resources) a model of sustainable multifunctional development of rural areas of the Municipality Arilje will be defined.

Experiences in the field of rural development in our region are modest with insufficiently affirmed issues of systematic changes taking place in Serbia. The Serbian economy is in a long period of social and economic changes that affect agriculture too. The process of transformation and structural adjustment of the economy is a sort of “catching up” with developed economies, but at a low level of economic development. Since then, agricultural and rural policy in Serbia is in constant change. This fact confirms the importance of choice of the concept for further development and creation of all the necessary preconditions for the establishment of economic and market system able to face the upcoming competition.

Rural areas can't build their future on traditional resources and activities, and the concept of a modern, sustainable development requires a new scenario, in order to achieve rural development processes that will launch development of an innovative behavior, in accordance with the social, economic, spatial and environmental factors of development.

Survey results will represent an important basis for the dynamic structure of development and change of economic structure, where agricultural development will not be primarily focused on increasing production, but on the development of products and services that are economically effective and efficient (competitive) and meet the new technical/hygienic and environmental requirements for food safety and attitude towards environmental protection an rural development.



## UVOD

Poljoprivreda Srbije ima dugu i poznatu tradiciju, a ruralne oblasti velike kulturne i prirodne potencijale. Kao specifična grana privrede predstavlja dinamičan sistem povezan, ne samo sa ekonomskim, već i političkim, tehnološkim i demografskim okruženjem. Nastale društveno-političke i ekonomske promene u privrednom sistemu sektor poljoprivrede (ili preciznije, ruralna područja) nije mogao da prati, zbog nedostatka koncepcije (od strane agrarne politike) i finansijskih izvora (politički problemi koji su prouzrokovali zatvorenost privrede i nedostatak direktnih stranih investicija). Ovaj sektor je pretrpeo ozbiljne proizvodne, ekonomske i ekološke posledice u niskoj efikasnosti i neadekvatnoj iskorišćenosti (smanjenje kapaciteta u stočarstvu, umanjenje prinosa, opadanje izvoza i povećanje uvoza, povećanje stepena ekološke zagađenosti, dr.).

U ovakvoj situaciji, razvoj poljoprivrede ne sme biti usmeren na vraćanje nivoa kapaciteta, proizvodnje i ekologije, putem intenziviranja postojeće strukture proizvodnje, na nivo iz 80-tih godina prošlog veka, već mora biti orjentisan na **MULTIFUNKCIONALNI**<sup>5</sup> i održivi razvoj. To znači, definisanje i razradu koncepcije i različitih modela i mera multifunkcionalnog ruralnog razvoja pojedinih regiona u Republici Srbiji.

Predmet istraživanja je područje Arilje na Jugozapadu Srbije.

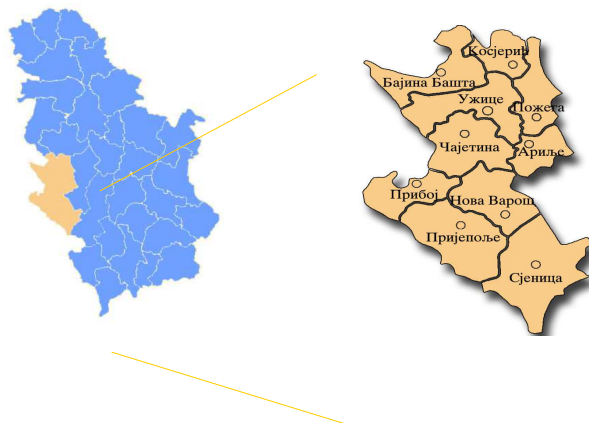
### OPIS PODRUČJA ARILJA

Područje opštine Arilje se nalazi u gravitacionom (funkcionalnom) području Užica, kao makroregionalnog centra koji opslužuje preko milion stanovnika i više sistema naselja u Zapadnoj Srbiji (**Slika 1**). Pored Arilja, za koje je predviđeno da se do 2010. godine oformi kao mali grad, u funkcionalnom području Užica se nalaze i gradski centri Požega i Bajina Bašta. Imajući u vidu geografski položaj, saobraćajnu povezanost i funkcionalno - privredne veze, na područje Arilja imaju jak uticaj i naselja iz funkcionalnog područja Čačka, i to prvenstveno Čačak kao regionalni centar, i Ivanjica kao gradski centar.

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<sup>5</sup> Pod pojmom «multifunkcionalnosti» ruralnih područja u ovom radu, podrazumeva se mogućnost korišćenja poljoprivrednih resursa, ne samo za proizvodnju hrane, već i razvoj nepoljoprivrednih aktivnosti koji se izražavaju kroz druge namene – funkcije (proizvodnja energije, turizam, zdravstvo, ugostiteljstvo, lov, ribolov, sport, osnivanje i razvoj malih i srednjih preduzeća, itd).

**Slika 1** Geografski položaj Opštine Arilje



Opština Arilje se nalazi u zapadnom delu Republike Srbije u slivovima reka Moravice, Velikog Rzava i Malog Rzava. Površina opštine Arilje iznosi 349 km<sup>2</sup>, što je manje od proseka u Republici Srbiji koji iznosi 467,5 km<sup>2</sup>. Ovo je brdsko-planinsko područje sa nadmorskim visinama od 330 metara do 1.382 metra.

Arilje je po površini teritorija najmanja od 10 opština Zlatiborskog okruga, kome po administrativnoj organizaciji pripada. Ona zahvata samo 5,68 % teritorije okruga. U odnosu na republiku Srbiji, opština Arilje zauzima samo 0,4 % teritorije Republike, odnosno 0,62 % njenog centralnog dela (bez Vojvodine i Kosova).

### **Organizaovanost naselja i najvažnije geomorfološke i druge osobine područja Arilje**

Naselje Arilje, koje je administrativno – upravno središte Opštine, nije smešteno u geometrijskom centru teritorije, već se nalazi u severoistočnom delu opštine, na ušću Velikog Rzava u Moravicu. Centar naselja se nalazi na 349 m nadmorske visine. Na ovom mestu se ukrštaju državni putevi prvog i drugog reda (M21/1 i R228), povezani sa mrežom opštinskih puteva, koji Arilju omogućuju vezu sa svim delovima opštinske teritorije.

Na teritoriji opštine Arilje razvila se mreža od 22 naselja, koju čine dvadeset jedno ruralno naselje i jedno naselje urbanog karaktera (Arilje). Većina sela se nalazi na udaljenosti do 10 km od opštinskog centra. Rastojanje između naselja Arilje i najudaljenije tačke u opštini iznosi oko 40 km. Na najvećoj udaljenosti od opštinskog centra su naselja Visoka, Bjeluša, Radoševo i Brekovo.

Geomorfološke karakteristike terena, istorijski i ekonomski uslovi uticali su na tip seoskog naselja, gustinu mreže naselja i na gustinu naseljenosti. Najviše naselja u Opštini, više od 40 %, ima do 25 stanovnika na 1 km<sup>2</sup>. Naselja sa 26-100 st/km<sup>2</sup> imaju učešće preko 45 % u

ukupnom broju naselja i najveći udeo broja stanovnika u Opštini. Nisku gustinu naseljenosti, imaju uglavnom periferna naselja u brdskim područjima.

Ariljski kraj, u celini posmatrano, pripada brdsko-planinskom području zapadnog dela Srbije. Osnovne karakteristike reljefa područja Arilje su relativno velike razlike u nadmorskoj visini, od oko 330 do 1.382 m. Najveći deo teritorije opštine (oko 70 %) nalazi se između 500-1.000 m.n.v. Teren do 500 m.n.v. se prostire u severoistočnom delu opštine i u pojasu uz reku Moravicu, dok se tereni preko 1.000 m.n.v. prostiru na jugozapadu opštine i zauzimaju svega oko 10 % teritorije opštine.

Ravni, obravniti tereni učestvuju sa oko 20 % u ukupnim poljoprivrednim površinama, odnosno oko 4.000 ha. Pretežne zemljišne površine su na srednje strmim i strmim nagibima. Velika raščlanjenost reljefa, u značajnoj meri, isključuje i otežava upotrebu mehanizacije u poljoprivredi.

Na klimu područja Arilje, utiču velike razlike u nadmorskoj visini, izražen reljef, pravci pružanja planinskih masiva, rečne doline i kotline, geološka podloga, biljni pokrivač, i dr. Zime su relativno suve i prohladne, proleća sveža, leta topla, jeseni toplije od proleća, ali relativno kratka. Prosečna godišnja temperatura vazduha na području opštine, u zavisnosti od nadmorske visine, kreće se između 8,5 i oko 10 °C. Temperaturna kolebanja su nešto veća u dolinama i kotlinama u odnosu na brdsko-planinske krajeve. Prosečna visina padavina u toku godine je oko 800 mm, od čega je više od 50 % u vegetacionom periodu, što se, sa aspekta razvoja poljoprivrede može smatrati povoljnim. Najviše vodenih taloga, po pravilu, pada u proleće (maj) i u prvom letnjem mesecu (jun). Sušni period se najčešće javlja od polovine jula do kraja avgusta, a samo u ekstremnim godinama, može se pojaviti u maju.

Teritorija opštine Arilje se odlikuje raznovrsnim tipovima zemljišta, koja se značajno razlikuju po litološkom poreklu, sastavu, starosti, dubini aktivnog sloja, mogućnostima akumulacije vode i proizvodnim vrednostima, što se direktno odražava na sadašnji i budući način korišćenja zemljišta. Prema načinu korišćenja, celokupan zemljišni fond opštine Arilje se razvrstava u produktivna zemljišta (poljoprivredno zemljište i šume) koja zauzimaju 96,8 % teritorije (33.438 ha) i neproduktivna zemljišta (kamenjari, zemljišta pod vodom, infrastrukturni objekti i dr.) koja zauzimaju 3,2 % teritorije (1.462 ha). Od produktivnih zemljišta, poljoprivredno zemljište obuhvata 60,2 % (20.126 ha), a površine šuma i šumskog zemljišta 37,8 % (13.184 ha). U strukturi poljoprivrednog zemljišta obradive površine (oranice, bašte, voćnjaci, livade) učestvuju sa 71,5 % (14.393 ha).

Šume i šumsko zemljište na području opštine Arilje zauzimaju površinu od 13.184 ha. Pošumljenost teritorije opštine je oko 38 %. (postoje odstupanja procenjenog i stvarnog stanja zbog obrastanja zapuštenog poljoprivrednog zemljišta i veštačkog pošumljavanja). Ukupna površina šuma i šumskog zemljišta u državnoj svojini na teritoriji opštine Arilje je 3.057 ha, od čega je 96,4 % obraslo šumsko zemljište, dok je 3,6 % neobraslo šumsko zemljište. Šuma u privatnom vlasništvu ima oko 10.200 ha.

Vodne resurse na teritoriji opštine Arilje čine uglavnom čiste i kvalitetne vode. Ovakve vode su pogodne pre svega za vodosnabdevanje, ali je veoma značajan i hidroenergetski potencijal Ariljskog kraja za mogućnost izgradnje i korišćenja energije iz malih hidroelektrana. Na teritoriji opštine Arilje postoje tri veća vodotoka, reke Moravica, Veliki Rzav i Mali Rzav (protok Velikog Rzava i Moravice iznosi oko 8m<sup>3</sup>/s). Slivovi Moravice i Velikog i Malog Rzava dreniraju šire područje nego što je sama opština Arilje, i čitav prostor je ispresecan mrežom rečica i potoka. Prisustvo viših delova terena uslovljava povećanu kondenzaciju vode u tlu što pogoduje izdašnostima izvora i uopšte prisustvo vode. Područje opštine Arilje raspolaže značajnim količinama pogodne vode za navodnjavanje gajenih kultura i pojenje stoke, što je važan preduslov za unapređenje i povećanje obima i vrednosti proizvodnje. Ograničavajući činioci su nedostatak uređenih vodotokova i neizgrađena mreža sistema za navodnjavanje.

Na teritoriji opštine Arilje nalaze se dva zaštićena prirodna dobra, spomenik prirode Kraški izvor Bjeluška potajnica i prirodna retkost biljna vrsta *Ilex acuífolium*, koja imaju status trajne, obavezne namene, i bez odgovarajućeg postupka u skladu sa zakonom, ne mogu se menjati. Zaštićena prirodna dobra, među kojima najviše ima predeonih celina očuvanog biodiverziteta i reprezentativnih hidrografskih objekata, karakteristična su za vizuelni identitet lokacija, nepostojanje velikih industrijskih zagađivača, i očuvan vodni potencijal, zemljišni resursi, biodiverzitet i prostorne i prirodne vrednosti.

### **Privredni resursi**

Privredna struktura Opštine pokazuje da su dominantne delatnosti poljoprivreda i prerađivačka industrija, u okviru koje značajni deo tekstilna industrija, prehrambena industrija, drvoprerada i metalska industrija. Udeo poljoprivredne proizvodnje u realizovanom ND se vremenom blago smanjuje u korist veće zastupljenosti prerađivačke industrije, što se ocenjuje kao pozitivan trend, uvažavajući veći stepen obrade proizvoda, a samim tim i njihovu veću vrednost, koju prerađivačka industrija odbacuje. Ipak, poljoprivreda još uvek dominira u strukturi ND, zahvaljujući pre svega, povoljnim

prirodnim uslovima za njen razvoj, kao i stečenoj tradiciji u proizvodnji određenih poljoprivrednih kultura, pre svega jagodičastog voća i šljiva, po kom je ovaj kraj postao prepoznatljiv (**Tabela 1**).

**Tabela 1** Pregled privredne strukture opštine – procentima %

<b>Privredne delatnosti</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
<b>Poljoprivreda</b>	44	46	44	41
<b>Prerađivačka industrija</b>	30	32	27	35
<b>Građevinarstvo</b>	5	4	6	4
<b>Trgovina</b>	7	8	10	11
<b>Saobraćaj</b>	3	3	5	4
<b>Ostalo</b>	11	7	8	5

Izvor: Zavod za statistiku Srbije

Ovi pokazatelji ukazuju na sliku lokalne privredne strukture, u kom pravcu opštinska uprava treba da reaguje za koncipiranje daljeg razvoja, kako bi stimulisala određene privredne segmente, odnosno delatnosti.

Istovremeno, zaostajanje u odnosu na zabeleženi nivo prosečne stope rasta ND (Narodnog Dohodka) Centralne Srbije i Republike, ukazuju na dalju potrebu jačanja performansi ukupne lokalne ekonomije i unapređenja konkurentnosti privrede Opštine, čime bi se dodatno uticalo na visinu ostvarenog ND, efektuirajući se i na visinu prosečne stopa rasta ND.

### **Stanovništvo**

Prema popisu stanovništva iz 2002. godine, u Opštini Arilje živi 19.784 stanovnika, od čega 34,1 % (6.744) živi u opštinskom centru, prosečna gustina naseljenosti iznosi 56,6 st/km<sup>2</sup>. Prosečna veličina KO ( katastarska opšina) je 15,9 km<sup>2</sup>, a prosečan broj stanovnika po naselju je 899, odnosno 592 ne računajući opštinski centar (Centralna Srbija ima prosečno naselje 1.371 stanovnika).

Aktivno stanovništvo čini 51,8 % (10.265) ukupnog stanovništva Opštine, lica sa ličnim prihodom 16,1 % (3.185), dok izdržavano stanovništvo čini 31,9 % (6.323). U strukturi delatnosti aktivnog stanovništva preovlađuje poljoprivreda (45,5 %), zatim slede prerađivačka industrija (27,9 %), trgovina na veliko i malo, opravka motornih vozila, motocikala i predmeta za ličnu upotrebu i domaćinstvo (6,7 %), građevinarstvo (3,3 %),

zdravstveni i socijalni rad (3,3 %), obrazovanje (3,0 %), državna uprava, odbrana i socijalno osiguranje (2,5 %), saobraćaj, skladištenje i veze (2,2 %) i dr.

Od ukupnog broja stanovnika Opštine, poljoprivredno stanovništvo čini 5.317 stanovnika, ili 268 % od ukupnog broja. Aktivno poljoprivredno stanovništvo predstavlja radni kontingent od 3.535, ili 17,8 % od ukupnog broja stanovnika Opštine, a 66,4 % od poljoprivrednog stanovništva. Izdržavano poljoprivredno stanovništvo učestvuje u ukupnom broju stanovnika Opštine sa 9 %, što predstavlja 1.782 stanovnika, ili 33,6 % od ukupnog broja poljoprivrednog stanovništva.

Demografska karakteristika opštine Arilje ne idu u prilog daljem socioekonomskom razvoju Opštine. Beleži se tendencija pada ukupnog broja stanovnika, pad nataliteta - stopa prirodnog priraštaja u opštini iznosi -1,6 promila, što je ispod republičkog proseka koji iznosi -1,0 promila, ali je iznad od proseka u regionu. Nepovoljna starosna struktura - populacija na teritoriji opštine Arilje je na nivou duboke demografske zrelosti sa prosečnom starošću stanovnika od 40,3 godine.

Obrazovna struktura stanovništva u opštini Arilje se značajno popravila u poslednjih dvadeset godina. Broj stanovnika starijih od 15 godina, bez završene osnovne škole, smanjio se sa 60 % u 1981. godini na 27 % u 2002. godini. Međutim, obrazovna struktura stanovništva Opštine je nepovoljna u poređenju sa obrazovnom strukturom Republike Srbije i Zlatiborskog okruga. Veće je učešće stanovništva sa nepotpunim osnovnim obrazovanjem, dok je udeo stanovništva sa višim i visokim stepenom obrazovanja (5,9 %) znatno ispod proseka Republike Srbije i Zlatiborskog okruga.

### **Privredna aktivnost**

Opština Arilje, kao najmanja u Zlatiborskom okrugu, sa 5,7 % teritorije, po ostvarenom stepenu ekonomskog razvoja se nalazi na trećem mestu među svih 10 opština Zlatiborskog okruga. Arilje svojim ekonomskim potencijalom doprinosi formiranju narodnog dohotka okruga u proseku sa 10 %. Podatak da u Opštini aktivno posluje oko 1.100 privatnih radnji i preduzeća ukazuje na razvoj preduzetništva i tradicije privatnog preduzetništva među stanovnicima.

Ariljska privreda je pretežno proizvodno-prerađivačka, vrlo raznovrsna, nije usko specijalizovana, prilagodljiva je uslovima tržišta i sa povoljnom vlasničkom strukturom. Dominantne privredne grane su poljoprivreda i prerađivačka industrija (prerada tekstila i

drveta, metaloprerada). U regionu su poznati tekstilni proizvodi iz Arilja, sa zaštićenim žigom kvaliteta "Ariljski tekstil".

### **Poljoprivreda**

U opštini Arilje nije izvršeno bonitiranje poljoprivrednog zemljišta, pa se za potrebe utvrđivanja proizvodne vrednosti zemljišta mogu koristiti samo katastarske klase, što je osnov po kome se održuje proizvodna sposobnost zemljišta za gajenje poljoprivrednih kultura.

Zemljišta prve četiri klase u ukupnim površinama učestvuju sa 3.369 ha, odnosno sa samo 16,74 %, uz velike razlike unutar makrozona i mesnih zajednica. Intenzivni način korišćenja poljoprivrednog zemljišta (oranice, bašte, voćnjaci) u ukupnim površinama poljoprivrednog zemljišta učestvuje sa 50,7 %, dok ekstenzivni način korišćenja (livade, pašnjaci) učestvuje sa 49,3 %. U pogledu intenzivnosti korišćenja poljoprivrednog zemljišta područje opštine Arilje je na samoj granici između intenzivnih i ekstenzivnih načina korišćenja.

Karakteristika upravljanja i korišćenja poljoprivrednog zemljišta je fragmentirana vlasnička struktura, usitnjen i rascepan zemljišni posed (prosečan posed 5-6 ha, od toga 3 ha obradivog zemljišta), visok procenat napuštenih i zaparloženih površina, nisko učešće ravnih i obradivih površina, na kojima je moguća mehanizovana obrada (20-25 %). U strukturi veličine poseda najveće učešće je gazdinstava koja imaju od 1-5 ha poljoprivrednog zemljišta, ili 49,1 % u odnosu na udeo u ukupnom broju poljoprivrednih gazdinstava, a gazdinstava veličine 5-10 ha učestvuju sa 31,4 %.

Od ukupnog broja poljoprivrednih gazdinstava (domaćinstvo koje je u vreme popisa koristilo najmanje 10 ari obradivog zemljišta) 1.663, odnosno 46,1 % su gazdinstva čiji prihodi potiču od člana, odnosno od članova gazdinstva koji obavljaju nepoljoprivredna zanimanja. Broj poljoprivrednih gazdinstava u kojima svi prihodi potiču od poljoprivrede je 1.117, ili 31 %, dok mešovita gazdinstva učestvuju sa 19 % (685 gazdinstva). Nije bez značaja, podatak, da su 136 gazdinstava (3,7 %) u kategoriji gazdinstva bez prihoda.

Prepoznatljiva grana poljoprivrede područja opštine Arilje je voćarstvo koje zauzima oko 3.470 ha (19 %) poljoprivrednih površina. Najzastupljenija voćarska kultura po površini je šljiva koja zauzima oko 1.800 ha, sa prosečnim prinosima oko 2,5-3 t/ha. Proizvodnja jabuke se organizuje na oko 750 ha, sa ostvarenim prosečnim prinosom oko 6 tona/ha. Nisko ostvarenje prinosa je posledica starog sortimenta i zasada. U novije vreme je prisutan trend podizanja novih zasada sa naprednom tehnologijom proizvodnje i sortimentom. Po

ekonomskom značaju malina je dominantna, i gaji se na oko 1.500 ha, na kojim se godišnje u proseku proizvode oko 20.000 tona maline, koja se, uglavnom izvozi. Malina se, kao radno intenzivna kultura gaji na celom području Opštine. Na malim, porodičnim zasadima na parcelama prosečne veličine od oko 0,3 ha. U ovu proizvodnju su uključene sve kategorije seoskog i gradskog stanovništva

Ratarska proizvodnja je najvećim delom u funkciji stočarstva, pri čemu se proizvodnja žita konstantno smanjuje. Kukuruz se proizvodi na relativno velikim površinama od oko 1.000 ha, i to pretežno (preko 95 %) kao hrana za stoku. Krmno bilje se proizvodi na oko 66 % poljoprivrednih površina, u iznosu od oko 20.000 t godišnje.

Učešće povrtarstva u ukupnoj biljnoj proizvodnji jedan je od indikatora stepena intenzivnosti poljoprivrede. Područje opštine Arilje spada u veće proizvođače krompira u Republici Srbiji. Proizvodi se oko 10.000 t tržišnih viškova krompira. Krompir se proizvodi na celom području Opštine. Proizvodnja ostalih vrsta povrća na otvorenom i zatvorenom prostoru je naturalno orjentisana za sopstvene potrebe.

Stočarstvo na području opštine Arilje je po vrednosti proizvodnje i ekonomskom značaju na drugom mestu, što nije u skladu sa raspoloživim agroekonomskim i drugim razvojnim uslovima. Nepovoljni ekonomski uslovi poslednjih godina uticali su na smanjenje učešće stočarstva u ukupnoj poljoprivrednoj proizvodnji.

### **Turizam**

Turizam kao privredna grana nije znatnije razvijen u opštini Arilje. Ukupno učešće Opštine u turističkom prometu regiona/okruga je ispod 1 %. Turistički promet poslednjih godina pokazuje tendenciju opadanja u pogledu i broja turista i broja noćenja. U planskim dokumentima razvoja primećuje se nedostatak strategije razvoja turizma na opštinskom nivou, nepostojanje turističke organizacije, nedovoljna edukovanost stanovništva o mogućnostima razvoja turizma na ruralnim područjima.

### **Komunalna infrastruktura**

Oština Arilje je sa širim prostorom povezana jedino drumskim saobraćajnicama. Mrežu puteva na području opštine Arilje čine opštinski putevi u dužini od 245,7 km, nekategorisani putevi u dužini od 400 km, državni put drugog reda u dužini od 43 km i državni put prvog reda u dužini od 17,7 km. Gustina putne mreže na teritoriji opštine Arilje iznosi 0,87 km/km<sup>2</sup> što je više od proseka centralne Srbije i Zlatiborskog okruga.



Ruralna putna infrastruktura još nije razvijena do društveno i ekonomski prihvatljivog nivoa u seokim oblastima. Loš kvalitet puteva i neredovan transport iz ruralnih u urbana područja ima ozbiljne efekte na, kako kvalitet života, tako i na ekonomske aktivnosti u ruralnim područjima. Nedostatak ruralne putne infrastrukture je limitirajući faktor da bi se ojačala poljoprivredna proizvodnja i produktivnost. Loši putevi, takođe ograničavaju obezbeđenje obrazovanja, zdravstvenih i kulturnih usluga.

Područje opštine Arilje upućeno je na snabdevanje električnom energijom i gorivom iz energetskeg sistema Srbije. Instalirana snaga postojećih trafostanica (35/10 kw i 10/0,4 kw) zadovoljava sadašnje potrebe potrošača, ali zbog nedostatka napajanja iz više pravaca nije obezbeđeno kvalitetno i sigurno snabdevanje električnom energijom. Izgradnjom TS 110/35/10 kw Arilje stvorini su preduslovi za sigurno i kvalitetno snabdevanje električnom energijom.

Primarno vodosnabdevanje najvećeg broja potrošača je sa vodosistema "Rzav". Sistemom za vodosnabdevanje opštine Arilje pokriveno je gradsko jezgro i 12 okolnih mesnih zajednica, koje su u neposrednoj blizini grada ili se nalaze u ravničarskom delu opštine (u Zoni naselja Arilje i u Zoni državnog puta prvog reda i reke Moravice). Ovim vodosistemom je obuhvaćeno oko 60 % stanovništva opštine Arilje. Veliki problem predstavlja letnji period kada vodosistem Rzav nije dovoljan i kada dolazi do velikih restrikcija u pogledu vodosnabdevanja. Ostala naselja se snabdevaju vodom sa manjih lokalnih izvorišta koja nisu u gradskom vodovodnom sistemu i koja se nedovoljno kontrolišu. Zbog konfiguracije terena, udaljenosti i male gustine naseljenosti, ta naselja nisu predviđena za priključenje na gradski vodovodni sistem.

Kanalizacioni sistem opštine Arilje je slabo razvijen u zoni naselja Arilje, dok u naseljima Brdsko-planinske zone ne postoji. Gradska kanalizaciona mreža je zajednička za industrijske, fekalne i atmosferske otpadne vode koje se ne prečišćavaju. U gradsku kanalizacionu mrežu sa zbirnim kolektorom nisu uključeni svi delovi sistema, u njemu se sakuplja oko 70 % otpadnih voda iz kanalizacione mreže i one se bez prethodnog tretmana ispuštaju u Moravicu. Pojedini delovi prigradskih naselja imaju zasebne kolektore, tako da se preostalih 30 % otpadnih voda se iz kanalizacionih odvoda bez prethodnog tretmana direktno ispušta u Veliki Rzav ili Moravicu. Na ostalim područjima Opštine ne postoje ni organizovani sistemi za sakupljanje i odvođenje otpadnih voda, kao ni sistemi za prečišćavanje otpadnih voda, već se upotrebljene vode ispuštaju u neadekvatno izvedene septičke jame, napuštene kopane bunare, okolne vodotokove, ili jednostavno na okolni teren.

Telefonska mreža sa područja opštine Arilje pripada mrežnoj grupi Užice. Fiksna telekomunikaciona mreža u opštini Arilje je organizovana preko šest telefonskih centrala. Delovi pojedinih naselja imaju obezbeđen signal fiksne telefonije preko mreža susednih opština. U pogledu opsluženosti telefonskim komunikacijama područje Opštine je sa 43,7 tel./100 stanovnika iznad proseka Republike (30,7). Stepen digitalizacije mreže je zadovoljavajući i iznosi 82,8 %. Međutim, problem predstavlja veoma mali prostorni obuhvat digitalnih priključaka, slabo razvijena mreža optičkih kablova i nepostojanje telefonskih govornica u centrima seoskih naselja.

### **Društvena aktivnost**

Na području opštine Arilje postoje 4 osnovne škole sa ukupno 97 odeljenja i 1.829 učenika, što čini 9,24 % od ukupnog broja stanovnika na teritoriji opštine. Na teritoriji opštine Arilje postoji jedna srednja škola sa 26 odeljenja i ukupno 729 učenika (sa pet područja rada: mašinstvo, elektrotehnika, tekstilstvo-kožarstvo, ekonomija, gimnazija).

Zdravstvena i socijalna zaštita je zastupljena preko Doma zdravlja u Arilju (190 zaposlenih) i zdravstvenih ambulanti u selima Visoka, Bjeluša, Brekovo, Dobrače, Kruščica i Severovo. Seoske ambulante karakteriše neodgovarajuća opremljenost i deficit stručnih kadrova, kao i nedovoljan broj radnih dana (sati).

Na području opštine Arilje zastupljena su raznovrsna kulturna dobra iz različitih vremenskih perioda, koja su proglašena ili uživaju prethodnu zaštitu. Kulturna dobra koja uživaju status prethodne zaštite (evidentirana kulturna dobra) zastupljena su pretežno u vidu arheoloških nalazišta, objekata sakralne arhitekture i narodnog graditeljstva, kao i kulturno-istorijske celine. U okviru kulturnih sadržaja u Opštini su zastupljeni dom kulture, biblioteka, bioskop, omladinski kulturni centar (u gradu) i 13 seoskih domova kulture. Seoske domove kulture uglavnom karakteriše nezadovoljavajuća opremljenost. Objekti za sport i rekreaciju su uglavnom smešteni u gradu, ili u prigradskim seoskim naseljima.

### **MODEL MULTIFUNKCIONALNOG RAZVOJA OPŠTINE ARILJE**

Korišćenje i upravljanje prostorom opštine Arilje, treba da dovede do organizovanog usmeravanja razvoja prostornih potencijala zasnovanih na sinergiji prirodnog, društvenog i privrednog potencijala. Jedini mogući, održivi teritorijalni, strukturalni i funkcionalni, socio-ekonomski razvoj područja opštine Arilje podrazumeva komplementaran razvoj kako urbanih, gradskih i prigradskih naselja, tako i ruralnih sredina brdsko - planinskog područja. Model multifunkcionalnog razvoja opštine Arilje obuhvata:

1. Konsolidaciju i uređenje proizvodnih resursa;
2. Podizanje obrazovnog kapaciteta i kulturnog identiteta;
3. Unapređenje poljoprivredne proizvodnje;
4. Podizanje lokalnih potencijala malih gazdinstava;
5. Poboljšanje pristupa tržištu;
6. Održivi oporavak seoskog prostora;
7. Razvoj lokalnih kapaciteta zajednice i motivacije;

## **STRATEGIJA IMPLEMENTACIJE MODELA RAZVOJA ARILJA**

### **Polazna osnova sprovođenja politike ruralnog razvoja u opštini Arilje**

U strukturi ruralnih područja i ruralnih domaćinstava poljoprivreda čini jedan značajan deo koji je čvrsto povezan s drugim privrednim delatnostima, društvenim i prirodnim okruženjem. Važnost poljoprivrede proizilazi, ne samo iz tradicionalne uloge osiguranja prehrambenih potreba stanovništva, već iz njene uloge u očuvanju ruralnog prostora, ekološke ravnoteže i održanju tradicionalnih vrednosti. Do sada se najveća pažnja usmeravala na poljoprivredne probleme, a ne na sveukupnost ruralnog područja.

Ruralni razvoj uključuje delovanje svih ključnih privrednih sektora u ruralnim područjima, te politika ruralnog razvoja ne može ići u korist samo određenih kategorija stanovništva, npr. poljoprivrednika. Korisnici politike ruralnog razvoja jesu sve grupe stanovnika (poljoprivrednici, preduzetnici, zanatlije, radnici i dr.), odnosno, ona mora biti na korist čitavom društvu.

### **Povećanje efikasnosti upravljanja resursima**

Nameće se potreba, uspostavljanja nove, verodostojne baze podataka o poljoprivrednom i ukupnom zemljištu. Prema procenama, koje su rezultat uvida na terenu, kao i analize pojedinih gazdinstava metodom slučajnog izbora, oranične površine su smanjene za oko 2.000 ha., promenom strukture korišćenja kao i izgradnjom objekata, (stambenih, poslovnih, infrastrukturnih). Takođe, smanjene su i ukupne poljoprivredne površine u korist šuma (oko 1.000 ha), uglavnom pretvaranjem pašnjaka i livada, a značajnim delom i oranica i starih zapuštenih voćnih zasada.

Treba izvršiti bonifikaciju proizvodne vrednosti zemljišta, ocenu ukupne sposobnosti poljoprivrednog zemljišta za gajenje privrednih kultura (plodnost, dubina-odnosno razvijenost profila, klima, nadmorska visina i konfiguracija terena), kao osnov za planiranje i upravljanje korišćenja poljoprivrednog zemljišta.

Treba obezbediti racionalno gazdovanje poljoprivrednim zemljištem i njegovu zaštitu, uređenjem i korišćenjem na principima održivosti, zaustavljanjem erozije i poboljšanjem prirodne plodnosti zemljišta, eliminisanjem uticaja aerozagađenja i drugih štetnih agenasa iz okruženja na plodnost poljoprivrednog zemljišta i zdravstveni kvalitet hrane.

U šumama u privatnom vlasništvu izvršiti procenu drvene mase, prirasta, bonitiranje zemljišta i snimanje ostalih parametara koji bi mogli doprineti kvalitetnijem pristupu u planiranju uzgoja i eksploatacije.

### **Poboljšanje obrazovanja i jačanje ljudskog potencijala**

Oorganizovati ogledna dobra i učeničke ekonomije po seoskim školama, pripremiti učenike (nove generacije), za unapređenje pristupa životu i radu na selu. Proizvodi iz navedenih školskih ekonomija bi se koristili u samim školama za ishranu učenika.

Organizovati poljoprivredne ogledne objekte (u svakom selu po jedan za određenu proizvodnju) za sticanje praktičnih znanja i iskustava učenika, mladih poljoprivrednika i povratnika iz gradova. Poželjno bi bilo da to budu ogledne porodične poljoprivredne ekonomije, kao posebni parkovi za prenošenje znanja o poljoprivrednim tehnologijama i inovacijama.

Tradicionalni godišnji seoski vašari, da postanu sajamske manifestacije, prezentacije, promocije, predavanja, kursevi, uz podsticanje takmičenja lokalnog stanovništva, davanje primerenih priznanja i nagrada.

Izgraditi i razvijati mreže aktivnosti koje podržavaju poljoprivrednu proizvodnju visoke prirodne vrednosti, uključujući istraživanja, obuku i savete koji promovišu primenu dobrih praksi, uvođenje inovacija i odgovarajućih tehnologija u poljoprivrednoj proizvodnji i preradi prehrambenih proizvoda malih razmera, kao i stalni razvoj i marketing prehrambenih proizvoda i pića.

### **Prilagođavanje agrarne strukture novim potrebama**

Dosada je poljoprivredno zemljište po svojim proizvodnim vrednostima korišćeno za proizvodnju voća (malina, kupina, druge vrste jagodastog voća, šljiva, jabuka, kruška, trešnja i jezgrasto voće), povrća (krompir i druge vrste povrća u otvorenom i zatvorenom sistemu uzgoja) i krmnog bilja za stočnu proizvodnju, sa izraženom prostornom disperzijom kapaciteta za skladištenje i primarnu obradu svežeg voća i povrća, koji su indirektno i stvorili postojeću proizvodnu strukturu.

Postojeća struktura poljoprivredne proizvodnje, sa nedovoljno razvijenom višom fazom prerade i dodate vrednosti su odraz koncepta kojim se ruralna područja svode na prostor za proizvodnju primanih poljoprivrednih proizvoda.

Inteziviranje proizvodnje je neminovno, ali da bi se negativni efekti upotrebe intenzivnih metoda industrijske poljoprivredne proizvodnje i opadanja plodnosti zemljišta umanjili, treba podsticati razvoj integralne poljoprivredne proizvodnje ekonomski isplativih i ekološki prihvatljivih poljoprivrednih i prehrambenih proizvoda, u cilju zaštite zdravlja ljudi, životinja, prirode i okoline, te zaštite interesa potrošača.

Zbog težine tranzicionog perioda, veliki broj poljoprivrednika je pred veoma teškim izazovima. Da bi prevazišli ovaj težak period i da nađu svoje mesto na tržištu poljoprivrednih proizvoda, treba da stupe u zadruga i organizacije poljoprivrednih proizvođača.

Prema zemljišnim uslovima i vrednostima proizvodnje, mogu se izdvojiti dve agroekološke zone opštine Arilje:

1. Zona naselja Arilje i magistralnog puta i reke Moravice: voćarstvo, stočarstvo, ratarstvo i povrtarstvo, i
2. Brdsko-planinska zona: stočarstvo, voćarstvo, ratarstvo i povrtarstvo.

U ovim zonama osnovni cilj u budućnosti može biti očuvanje i korišćenje zemljišta usklađivanjem svih interesa u prostoru. Ukрупnjavanje zemljišnih jedinica poljoprivrednog zemljišta, konsolidacija (usitnjen i rascepan zemljišni posed, visok procenat napuštenih i zaparloženih površina, nerešeni vlasnički odnosi, staračka domaćinstva), trebaju biti praćeni s agrarno-političkim merama podrške privrednom napretku poljoprivrede.

### **Očuvanje vitalnosti malih gazdinstava**

Nizak nivo razvijenosti područja zahteva spoljne intervencije pokretanja aktivnosti diverzifikacije prihoda, jer lokalni potencijali u selima, najčešće nemaju taj kapacitet. Uz to je nužno i stvaranje sopstvenih, ili lokalnih izvora prihoda, kojima bi se podržale aktivnosti diverzifikacije prihoda i započinjanja nove delatnosti. To je važno za potvrđivanje sopstvenog potencijala, da bi se kandidovalo za spoljne izvore podrške, mikro kredite, subvencije, podsticaje, regres, itd.

Ograničene proizvodne mogućnosti na malim poljoprivrednim gazdinstvima, opadanje relativnog značaja poljoprivrede, zahtevaju alternativne mogućnosti zapošljavanja u ruralnim područjima.

Bliži urbani centri, se oslanjaju na dostupne izvore snabdevanja u svom okruženju, a raste i tražnja za različitim proizvodnim i uslužnim programima. Zato treba računati sa razvijanjem manjih i fleksibilnih pogona za preradu i konzerviranje voća i povrća, saglasno potencijalima izvora sirovina i to u rasponu od poluzanatskih do poluindustrijskih pogona.

### **Tržišno organizovanje i povezivanje**

Treba inicirati povezivanje i udruživanje proizvođača u cilju zajedničkog nastupa na tržištu nabavke i prodaje, marketing, kao i u pristupu izvorima finansiranja, jer postojanje jakih udruženja poljoprivrednih proizvođača i drugih oblika organizovanja jača tržišni kapacitet i pregovaračku poziciju malih proizvođača.

Tržišnu infrastrukturu savremene distribucije poljoprivrednih proizvoda može razviti izgradnja na veleprodajnom nivou. Lokalna uprava opštine Arilje može da se javi u ulozi inicijatora za uspostavljanje saradnje i povezivanje učesnika u lancu proizvodnje i marketinga svežeg voća i povrća kao važnog segmenta poljoprivrednog potencija opštine i izgradnju logističkog centra za skladištenje i distribuciju, na principima javno-privatnog partnerstva.

Nužno je formiranje mreže zadruga po selima, prilagođenih lokalnim prilikama. Specijalizovane i opšte zadruge omogućile bi koncentraciju proizvoda od malih proizvođača, objedinile nabavku i prodaju, marketing, transfere PDV, lokalnu koncentraciju prihoda i potrošnje; stvorivši uslove za formiranje baze za mikro kreditiranje.

### **Integralni razvoj seoskog područja**

Integralni razvoj seoskog područja, kroz unapređenje seoske ekonomije, disperzije proizvodnje u manje razvojne centre, će korigovati postojeći produktivistički model razvoja. Svaka jedinica lokalne i mesne samouprave mora oceniti, koja je aktivnost prioritarna za zaustavljanje iseljavanja. Opštini Arilje je potrebna strategija seoskog razvoja i održive poljoprivrede da bi podstakla uravnotežen razvoj seoskih oblasti i zajednica, i da bi ublažila strukturne promene u poljoprivredi. Realizacija ekonomskog potencijala poljoprivrede u seoskim oblastima i područjima ne sme biti praćena socijalnom dislokacijom i narušavanjem životne sredine.

Nužno je aktivno uključivanje ekološke komponente u sve segmente razvoja i razmeštaja proizvodnih kapaciteta, usklađenih sa resursnom osnovom, kapacitetom sredine, ljudskim potencijalom i održivim razvojem. Problemi kvaliteta životne sredine na pojedinim mikrolokacijama (npr, koncentracija industrijskih objekata u užem gradskom području)

pojačavaju konflikt interesa različitih korisnika prostora (stanovanje, poljoprivreda, industrija), posebno u dolini reke Moravice.

Jedan od prioritetnih ciljeva je obezbeđivanje uslova za ravnomerniji prostorni razvoj opštine, kroz plansko stimulisanje nedovoljno razvijenih delova. To bi umanjilo i zaustavilo negativne demografske tokove, poboljšalo obrazovnu strukturu i smanjilo nezaposlenost. Ravnomerno razvijena seoska područja i poboljšanje uslova života seoskog stanovništva, kroz unapređenje poljoprivredne proizvodnje i infrastrukturnih objekata, zahteva definisanje plansko - razvojnih zona. Te zone bi sprečile zauzeće i prenamenu poljoprivrednog zemljišta. Za plansko - razvojne zone treba uraditi urbanističke planove i komunalno ih opremiti. Razvoj MSP u tim zonama podržati stimulacijama za investitore. Prostornim i urbanističkim planovima ne opredeljavati namenu prostora, već samo uslove za gradnju. Ostaviti preduzetnicima razvoj ideje i programa.

Formiranjem Fondacije za selo podržati mobilizaciju stanovništva, naseljavanje urbanog stanovništva u ruralna područja. Fondacija bi se bavila kupovinom napuštenih imanja, davala u zakup kuće i okućnica i podržavala ukрупnjivanje zemljišnih površina. Održavanje napuštenih domaćinstava i zemljišta pod šumom, da se nebi gubila važna obeležja predela i zaštita biodiverziteta, jer napuštene površine obrastaju nepoželjnom vegetacijom.

### **Mobilizacija kreativnog potencijala**

Mobilizacija kreativnog potencijala znači podsticanje saradnje i posredovanja u povezivanju učesnika važnih za ruralni razvoj Opštine, koji žele podržati ostvarenje zajedničke vizije u kojoj stanovnici ruralnih prostora svojim društvenim i privrednim delovanjem pridonose njenom razvoju, te aktivno sudeluju u brizi i očuvanju prostora u kojem žive. U procesu izrade programa i planova, posebno operativnih programa, okupiti i animirati stanovnike lokalnih zajednica, motivisati zajedništvo i saradnju i postaći razvojna razmišljanja.

Treba podržavati partnerstvo javnog, privatnog i civilnog sektora za participativne pristupe i inicijativama koje dolaze iz lokalnih zajednica kao osnovama za održivi ruralni razvoj. Osnovati lokalne centre razvoja Opštine po selima kao mesta individualnoj i zajedničkoj motivaciji i kreativnosti. Postojeće zadružne domove kulture po selima, pretvoriti u centre okupljanja, organizovanja i delovanja lokalnog stanovništva.

Celishodno je pokrenuti inicijativu za izgradnju "Zavičajne kuće" u Arilju sa udruženjem građana iz Beograda koji su poreklom iz Ariljskog kraja. Kuća bi bila mesto okupljanja za ljude koji osećaju pripadnost kraju, nose veliki kreativni potencijal i iskustvo, koje može predstavljati nemerljiv doprinos i podrška razvoju.

## **ZAKLJUČNA RAZMATRANJA**

Na osnovu istraživanja u ovom radu došlo se do sledećih zaključaka:

Razvoj poljoprivrede ne može biti usmeren samo na intenziviranje postojeće strukture proizvodnje, već mora biti orjentisan na multifunkcionalni i održivi razvoj. To znači, definisanje različitih proizvodnih i uslužnih programa razvoja ruralnih područja. Poljoprivreda ostaje najveći korisnik i potrošač ruralnog prostora, pa je najodgovornija za njegovo stanje.

Samo planiranje celovitog, sveobuhvatnog razvoja manjih prostornih ruralnih celina na načelima održivog razvoja, obezbeđuje uspešnim model oživljavanja i napretka nerazvijenih ruralnih područja.

Koncept ruralnog razvoja (uspostavljanje skladnijeg razvoja poljoprivrede i drugih proizvodnih i uslužnih delatnosti radi optimalnog korišćenja raspoloživih resursa u skladu sa principima održivog razvoja) i multifunkcionalnost, podjednako dobijaju na značaju u zemljama EU i zemljama u tranziciji.

Ruralne oblasti u Srbiji se značajno razlikuju po ekonomskim, socijalnim i demografskim karakteristikama. Migracije, slaba diverzifikacija ekonomskih aktivnosti, ekstenzivna poljoprivreda (kao dominantna ekonomska aktivnost), visoka stopa nezaposlenosti, slaba i nerazvijena infrastruktura, nizak BDP po glavi stanovnika u poređenju sa urbanim oblastima i sve veći pritisak na zagađenja životne sredine, su osnovni problemi ruralne oblasti.

Koncept ruralnog razvoja i strukturnih podsticaja, potrebno je zasnivati na sinergiji zaštite životne sredine, društvenog i privrednog potencijala, lokalnoj tradiciji i posebnosti, individualnoj i zajedničkoj motivaciji i kreativnosti, i partnerstvu javnog, privatnog i civilnog sektora. Za posticanje takvog ruralnog razvoja potrebno je razviti poseban pristup, mere i fondove.

U ovom radu pod multifunkcionalnošću ruralnih područja se podrazumeva korišćenje poljoprivrednih resursa, ne samo za proizvodnju hrane, već i razvoj nepoljoprivrednih aktivnosti koji se izražavaju kroz druge namene – funkcije (proizvodnja energije, turizam, uslužne delatnosti, zdravstvo, ugostiteljstvo, lov, ribolov, sport, osnivanje i razvoj malih i srednjih preduzeća, i dr.). Cilj navedenog pristupa je učiniti ruralne krajeve privlačnima za život. Bez kreiranja i uvođenja novih delatnosti i izvora prihoda izvan poljoprivrede u ruralnim oblastima, nema proširenja mogućnosti zapošljavanja i zaštita ruralnog bogatstva. Diverzifikacija i razvoj aktivnosti imaju važne ekonomske posledice koje će doprineti



ulaganjem u seosku infrastrukturu i stvaranjem boljih uslova života koje će umanjivati potrebu za iseljavanjem, prevenciju depopulacije ruralnog stanovništva.

Novi koncept ruralnog razvoja zasniva se na uzajamnom približavanju lokalnih učesnika u razvoju i stvaranju veza među njima. Osposobljene za sopstvene razvojne inicijative, lokalne zajednice će preuzimati odgovornosti za njihovu implementaciju i biti odgovorne za donošenje lokalnih ruralnih razvojnih strategija i nalaženje sigurnih izvora finansiranja.

Primenom koncepta multifunkcionalne poljoprivrede, koja će poštovati okolinu, ograničava se konflikt između ekonomskog rasta i zaštite prirodne sredine.

Multifunkcionalna poljoprivreda u ruralnom razvoju danas upravo podrazumeva međusobnu interakciju uticaja agrarne proizvodnje na ruralni razvoj i obrnuto, uticaj ruralnog razvoja na pokretanje nekih vidova agrarne proizvodnje, koji do tada nisu bili prepoznati. Promocija specifičnih odlika domaćih proizvoda i širenje znanja o dobroj poljoprivrednoj praksi radi očuvanja životne sredine, podsticaj je stvaranja novih mogućnosti za zapošljavanje u cilju smanjivanja stepena siromaštva i povećanje kvaliteta života u ruralnoj Srbiji, sa posebnom brigom za uključivanje žena, mladih i marginalizovanih grupa.

Dugoročni održivi razvoj ruralnih područja je strateški cilj privrednog razvoja, budući da i drugi ekonomski i društveni sektori imaju veliki uticaj na razvoj ruralnih područja.

Važna je i uloga, kako sitnih, tako i srednjih poljoprivrednih gazdinstava u razvoju ruralne ekonomije i očuvanju ruralnog ambijenta. Opstanak malih gazdinstava uslovljen je diversifikacijom privrednih aktivnosti u pravcu nepoljoprivrednih delatnosti, koje povećavaju ukupnu zaposlenost i dohodak u ruralnoj oblasti.

Ne može se u potpunosti preuzeti gotov sistemski model iz drugih zemalja, kao i upravljačkih metoda i tehnika iz sistema sa sasvim drugim vrednostima i razvojnim ciljevima i organizacionim ponašanjem. Izbor je u sopstvenom struktuiranju efikasnog modela razvoja i koncepta multifunkcionalnog i održivog razvoja ruralnih područja i pravilno kordiniranim strategijama, da se na osnovu multifunkcionalnog pristupa poljoprivredi, obezbedi rast i razvoj specifične proizvodnje roba i pružanja usluga poljoprivredne i nepoljoprivredne delatnosti u skladu sa principima održivog razvoja, a u cilju poboljšanja ekonomskih efekata i obezbeđenja vitalnosti i konkurentnosti ruralnih područja.

Predloženi model multifunkcionalnog razvoja, (izgradnja napredne proizvodne strukture, podizanje obrazovnog i kulturnog identiteta, unapređenje poljoprivredne proizvodnje u ruralnim područjima, podrška razvoju malih gazdinstava, izgradnja tržišne logistike,

očuvanje ruralnih vrednosti, podrška povezivanju interesnih grupa), treba da doprinese preduzimanju sopstvenih mera razvoja politike i prakse podsticanja održivog razvoja ruralnih područja.

U pogledu modela budućeg razvoja, Srbija treba da se opredeli za koncept razvoja održive poljoprivrede, koji poljoprivredu stavlja u znatno širi kontekst od njenog značaja u pogledu samog doprinosa BDP. Za osnovno polazište uzima se višestruka uloga poljoprivrede koja ima funkciju održivog ruralnog razvoja, funkciju očuvanja životne sredine i dugoročno održivog gazdovanja resursima, ekonomsku funkciju, funkciju podrške razvoju turizma, socijalnu, prehrambenu i kulturnu funkciju (kroz očuvanje tradicije i kulturnog nasleđa na selu).

Mere i akcije neophodne za primenu definisanog modela, podrazumevaju promenu modela ekonomskog rasta i razvoja zasnovanog na rastu domaće potrošnje i uvoza. To je investiciono i izvozno orijentisani model privrednog rasta. On podrazumeva odgovornu upotrebu javnih resursa, poboljšanje i unapređenje obrazovnih programa i praktične obuke u ruralnim područjima, povećanje konkurentnosti poljoprivrednog sektora, održavanje najvećeg mogućeg broja ruralnih domaćinstava na selu, funkcionalnu povezanost trgovačkih sistema za podršku, valorizaciju ruralnog karaktera i nasleđa i kreiranje okoline za podršku.

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**„GAZDASÁGI KANNIBALIZMUS – HÁTRÁNYOS HELYZETŰ CSOPORTOK A MUNKAERŐPIACON ÉS AZ EMBERI ERŐFORRÁS MENEDZSMENT”  
(ECONOMICAL CANNIBALISM – DISADVANTAGEOUS GROUPS AT THE LABOUR MARKET AND HUMAN RESOURCE MANAGEMENT)**

**Edited by: dr. György Szretykó**

**Published by Comenius Ltd, Pécs, Hungary, 2012.**

The monograph is based on the material of the conference „Hátrányos helyzetű társadalmi csoportok a munkaerőpiacon” (Disadvantageous social groups on the labour market) organized on 24th September 2011 at Veszprém, Hungary by Hungarian Academy of Sciences - Regional Committee in Veszprém – Committee on Sociology. The book was published in 2012 by Comenius Ltd., Pécs, Hungary. The articles call attention to the economical cannibalism, the position of disadvantageous groups at the labor market of Hungary and European Union (EU).

In the introduction the editor, dr György Szretykó, based on David C. Korten’s approach, emphasizes the causes of the crisis of global capitalism and problems in the European Union. The concept of human economy is described, too. The editor states that the transformation to this new economy is not possible without the transformation of global property and income systems and the development of new mechanisms of regulation and control.

This book consists of more than 530 pages and is divided into three parts. The first five articles deal with the problems of economic cannibalism, social disparities and social disadvantages. The four articles in the second part are devoted to the characteristics of disadvantageous groups and their position on the labor market. The last nine articles placed in third part of the book describe the labor market opportunities of disadvantageous groups and the tasks of human resource management and counseling in the employment of workers with disabilities.

In the first part Ferenc Somogyi presents his ideas about economic cycles, their nature, classification and impact on human resources. The author describes medium-term cycles, such as Kondratyev’s cycle and human capital cycle. Besides, he presents different scenarios describing the changes at the beginning of 21.st century.

Csaba Vass in his study deals with the problem of transition, micro- globalization and employment in Hungary between 1990 and 2011. The study begins with the presentation of the antecedents of modern employment strategies, where he calls attention to the fact that in

one country there are more ways of coexistences; the employment strategy is defined by more sources of power. The author draws parallels between two models of globalization: macro - globalization and micro - globalization and their impact on employment and human resource management. The macro - globalization means the dominance of the huge, global multinational organizations, while for micro - globalization the small and medium-sized enterprises are characteristic. The different models of globalization influence the required skills of employees, the employment strategy and even the demographic trends of a society.

Dániel Kári and Gyula Lakatos write about economic growth and the society's euthanasia. They describe Keynes' ideas about market economy, as well as Giddens' thoughts about the responsibility of poverty. The authors share their opinion about the demoralization and bureaucratization of educational institutions. A special attention is drawn to human resources in the world of work and its market value. The last part of the study is devoted to a presentation of a case study on the economical cannibalism at the health sector. Kári and Lakatos highlight the actual problems of medical system in Hungary, such as the emigration of physicians and financial and organizational problems.

Balázs Varga calls attention to different conceptions of poverty and different approaches to exclusion. In his paper the author underlines the difficulties of the definition and measurement of poverty and exclusion. Exclusion is a more complex phenomenon as it means not only the material situation, but the narrower possibilities of individuals, concerning rights, actions, sources etc. Varga emphasizes the importance of fighting against social inequity and injustice.

Magdolna Levelecki describes the impact of economical crises on different regions of Hungary and the effect of employee-commuting from undeveloped regions to the companies of more developed regions. She based her study on the employment data of Fejér County. Levelecki states that the growth of untypical employment arrangements is the result of economical crisis. The author stresses that in Hungary the number of commuters nowadays is about 1 million, so almost every 10.th inhabitants and every third employer is traveling for the workplace. The closing down of plants, companies and institutions in the rural region makes the territorial differences between undeveloped rural and developed urban regions more expressed.

In the second part of the monograph Zoltánné, Ács Imre and György Szretykó give the diagnosis of the position of mentally handicapped people at the labor market of European Union and Hungary. The authors present the definition and classification of mentally handicapped people and the usual negative stereotypes and legal regulations hindering their

employment. The second part of the paper introduces the results of questionnaire-based research about the employment of mentally handicapped people in the civil sector of Székesfehérvár, Hungary. The conclusions of the research are that handicapped people would like to work but they need professional help in the process of employment.

Nikolett Szabó and György Szretykó describe the labor market possibilities of employees with disabilities in Ajka, Hungary. After presenting the characteristics of labor market position of employees with disabilities in Hungary, their employment counseling, training and types of employment and Hungarian statistical data concerning the above topics the authors call attention to the results of a field research carried out in Ajka. The results of the research confirm that the employment of invalids is very challenging task. Besides their health status, often their low educational level and passive attitudes make them difficult to find an appropriate job. The authors stress that there is a need for their professional counseling and for social measures to change the employers' attitudes, as well.

Miklós Kenderfi in his article deals with the problem of career maturity of disadvantaged young people. He describes the concept of career maturity and the use of Career Maturity Inventory, as a measurement to determine it.

Károly Szerencsi analyses the position of marginalized social groups in the labor market of Békés County. The author presents the causes of unemployment and antecedents of the crisis of European social and employment model. The paper presents the results of a field research, too. The results show that in Békés County the proportion of marginalized social groups is high, and the possibility for their labour market integration is slim.

In the third part of the book Piroska Györi and Krisztina Kisfalvi Rózsa call attention to the furtherance of rehabilitation and employment of employees with disabilities. In their article the authors describe the phenomenon of complex rehabilitation and its practical realization in Hungary.

Andrea J. Klér writes about the psychological questions of labor market integration of employees with disabilities, their carrier plans and possibilities. The author presents Scheins's carrier anchor model and its application for employees with disabilities. Klér states that human resource counseling can be an effective alternative for labor market integration of employees with disabilities.

Éva Molnár and Adél Vehrer present the special way of the development of work motivation among disadvantaged people. The author presents data about work motivation of Roma people, the successful model of Roma integration of Uszka village, Hungary, and the lessons of missionary work among offenders.

Andrea Homoki introduces the pedagogical vocational trainings concerning the education of disadvantaged children in Hungary and in the European Union. The empirical research has mapped the supply characteristics of the accredited Hungarian in-service training system, and compared it with real teacher needs and demands. The author claims that both on the demand and supply sides the training content aimed at developing teachers' skills and competences and at background knowledge promoting the education and treatment of children with a wider interpretation of special needs which area is rather loosely attached to subject teaching is underrepresented.

József Albert and Bánk Bálint write about burnout and teachers' training preventing burnout. The authors present the causes and symptoms of stress and burnout generally, and typical causes concerning the job, work tasks and roles of teachers. They present techniques for primary, secondary and tertiary prevention, too.

Eszter Barakonyi presents the old age policy and the rights of older people in the European Union. They present the impact of Lisbon Strategy and other European legal acts on the rights and position of old people in the EU.

Béla Krisztián deals with the problem of how companies welcome and orient their new employees with disadvantages. The author stresses that the company and its HR managers have to be well prepared and trained for the employment of employees with disadvantages.

Kornélia Nagy presents the employment of workers with disadvantages at Rába-Jármű Ltd. She presents the statistical data, the legal regulation and the equal-opportunities programs and measures at Rába-Jármű Ltd. The author emphasize that the employment of workers with disabilities will have positive effect not only on the organizational culture but on profit, too.

The last paper written by Attila Pongrácz deals with the possibilities of integrated HR counseling in improving the labor market opportunities of disadvantaged social groups. The author focuses on the employment of women and young people and suggests counselling and coaching techniques to assist that process.

As the monograph present important theoretical analyses and empirical researches on the labor market position of disadvantaged social groups on the labor market of Hungary and European Union, it may be a valuable source of primer data, analyses and suggested solutions not only for Hungarian experts, students and decision makers from the field of demography, sociology, human resources, regional studies and social policy but for all interested in the human aspects of modern societies. This is why I recommend this

monograph to the readers of the Deturope-Central European Journal of Regional Development and Tourism.