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Transfer of Knowledge and Innovation as a Model of Rural Development of Smederevo Region in Serbia

***Abstract:** Many factors affect low investments in Smederevo and among them, above all, are: high commercial and non-commercial risks, tardy economic transition and underdeveloped institutions, which guarantee in practice the rights deriving from the private property and contracts. Rural development in Smederevo requires that sources of competitiveness move toward high education, the efficient market and capability to earn on the existing technologies, i.e. the focus of agriculture should be moved from physical resources to knowledge, especially since agricultural enterprises in Smederevo have non-profitable business performances, which manifest through decline in the market share and profitability, increase in indebtedness, inadequate investments and the increased volume of new business ventures at the expense of the primary business. It is noticeable that the adequate entrepreneurial skills and the innovated managerial abilities and skills are necessary. Accordingly, exactly the development of innovation and transfer of innovative knowledge and technologies from the academic to agricultural sector are the most important form of activities, which stimulate development. In that sense, it is necessary to stimulate the common work of universities, research institutions and agriculture as well as to use the equipment and knowledge of everybody at universities and institutes by the companies and vice versa and the student projects and practice. The policies of labour market should increase the participation of additional education programmes and training in measures of an active employment policy, which comprises the different programmes of qualifications and trainings, re-trainings and additional trainings, functional primary education of adults. At the same time, the above-mentioned programmes should be directed to the most vulnerable groups in the labour market and individuals with multiple vulnerability factors, first of all, through strengthening capacities at the local level for improvement of educational development and trainings in the field of agriculture and rural development.*

Keywords: knowledge, innovation, agriculture, competitiveness, rural development

Introduction

Both in the economic theory and the modern practice, it is well known that: if a total capital, as a production potential is divided conditionally into natural (Kp) and created by man – physical and intellectual (Kh), it is necessary for the total capital stock (Kp+Kh) not to decrease during a specific time (Milanovic et al., 2008).

It is an obvious condition that there should be a certain level of substitution among the different forms of capital, i.e. that the inevitable decrease in the natural capital should be replaced by an increase in the available human and primarily the intellectual capital. Thus, this can only be achieved by increasing the application of already acquired and new knowledge and the best modern production practice, or by using resources of the total scientific-technical and cultural potential. That is to say, the transition of economy implies the significant application of knowledge, innovation and new technologies, which includes numerous reforms in the field of education, science, scientific-research institutions and consulting (Cvijanovic, 2009).

The essential contribution and the main role in meeting this condition belongs exactly to science, the profession, i.e. the adequate network of institutes and faculties, which should provide the necessary support to enterprises in managing the transformation processes, as well as in creating a new sector. Consequently, it is inevitable to have a decentralised and regional approach to education. In these conditions, the educational structure of population in the Republic of Serbia is a special challenge.

The problems regarding the educational approach have not been solved; the drop-out rate of children is present at all educational levels, and comparing most of the indicators, we are at the bottom of the European list. Still around 10% of population fails to graduate from the elementary school (whether they do not register in school at all or drop out during the elementary school).

Between 90% and 95% of those who graduate from elementary school registers in secondary schools (around 80% of a generation), and around 15% of those registered do not graduate from the secondary school (35% of a generation). Only 13% graduates from a college or a university. The situation is somewhat better if we look only at the active population, but the level is far lower than the EU average: 19% with the tertiary diploma against ca. 30% of the EU average (*Nacionalna strategija zapošljavanja za period 2011-2020 godine*).

Decreasing a number of persons who leave their education early and the increase in the share of highly educated population in the total population, which the EU has defined as one of its priorities, represents also a challenge for the Republic of Serbia.

Analysis of agricultural potentials in Smederevo

Since the beginning of the 21st century, the contribution of GDP declined, primarily as a consequence of faster activity growth in non-production sectors (first of all – trade). However, the share of agriculture in the GDP structure of economy of the Republic of Serbia is still very high. Compared to the average of the EU countries (27 Member States), the Republic of Serbia has significantly higher share of GDP from the agricultural sector in the total GDP, and significantly lower share of the sector of services (*Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014-2020 godine*).

In such conditions, the economy structure of the city of Smederevo can be analysed through the structure of employees. According to the data in table 1 a total of 76.2% of employees was registered in legal entities (companies, enterprises, institutions, cooperative associations and other organisations), while the remaining 23.8% were entrepreneurs and their employees (RZS, 2014).

The elementary sector (agriculture, forestry and fishery) employs 0.5% people and the secondary sector (industry, trade, tourism, catering industry, etc.) – 35.9%. The largest number of employees in the legal entities sector is engaged in the secondary sector, i.e. processing industry (34.5%).

Table 1. Structure of employees, 2013, annual average¹

Employees in legal entities (companies, enterprises, institutions, cooperative associations and other organisations) ²	Region, area, city – municipality			
	Danube area	Velika Plana	Smederevo	Smederevska Palanka
Total	100.00	100.00	100.00	100.00
Total	74.6	64.2	76.2	79.2
Agriculture, forestry and fishery	0.8	1.5	0.5	0.8
Mining	0.1	0.7	0.0	0.0
Processing industry	27.4	6.5	34.5	26.0
Power, gas and steam supply	1.1	1.0	1.2	0.9
Water supply and wastewater management	2.4	0.8	2.4	3.5
Construction	4.3	12.2	1.7	5.0
Wholesale and retail and repair of motor vehicles	7.3	15.3	5.4	5.7
Transportation and storage	3.9	4.7	4.0	2.9
Accommodation and food services	0.4	0.7	0.4	0.3
Information and communication	0.4	0.3	0.5	0.2
Financial activities and insurance activities	0.5	0.2	0.6	0.5
Real estate business	0.2	0.0	0.4	0.0

table 1 cont.

Professional, scientific, innovative and technological activities	1.6	1.1	1.6	2.0
Administrative and auxiliary service activities	0.4	0.9	0.3	0.3
State administration and compulsory social insurance	3.6	2.0	4.1	3.6
Education	9.2	9.7	8.4	11.0
Health insurance and social protection	9.5	5.6	8.5	15.4
Art entertainment and recreation	0.7	0.6	0.6	1.2
Other service activities	0.7	0.3	1.0	0.1
Private entrepreneurs and their employees	25.4	35.8	23.8	20.8

¹ Annual averages calculated on 31st March and 30th September.

² There were also employees in small companies (up to 50 employees), who had not been covered by a regular, half-yearly research, because of the assessment in the Survey for supplement of Half-Yearly Research on Employees.

Source: RZS, 2014, p 166.

Although there is a small number of employees engaged in agriculture (0.5%), the data refers only to the ones engaged in the legal entities sector. However, according to the data in table 2 there is a high percentage of the economically active population engaged in agriculture, i.e. 9.2% (RZS, 2011). In accordance with the Census of 2011, there are 2,843 persons who rank among farmers, foresters, fishermen and related occupations.

Table 2. Economically active population with occupation, according to age, sex and occupation, by municipalities/towns

Region Area City-municipality	Total	Occupation											
		Executives, senior officials and legislators	Experts and artists	Engineers, associates and technicians	Administrative officials	Service and sales workers	Farmers, foresters, fishermen	Trades, folk and related occupations	Machines operators, fitters and drivers	Primitive occupations	Military occupations	Unknown	
Smederevo 3	0,794	642	3,524	4,801	2,133	5,240	2,843	5,498	2,949	2,586	260	318	
15-24	1,894	8	50	204	137	523	148	356	157	237	38	36	
25-34	7,526	1	32	906	1,064	563	1,678	399	1,304	752	524	128	76
35-44	8,643	1	83	1,020	1,372	583	1,568	587	1,561	885	702	83	99
45-54	8,039	1	99	950	1,550	630	1,101	551	1,473	832	667	11	75
55-64	4,307	1	19	587	607	218	364	846	799	320	417	-	30
65 and more 3	85	1	11	4	2	6	312	5	3	39	-	2	

Source: RZS, 2011.

Prevailing production trends in agriculture of Smederevo are (*Strategija lokalnog ekonomskog razvoja period 2009-2014 godine*): crop farming, livestock breeding and vegetable growing (Morava area); fruit growing and viticulture (*Sumadija area*). Due to a mild continental climate, the Smederevo region has favourable conditions for successful growing of almost all fruit varieties and grape vine (*Strategija razvoja poljoprivrede na teritoriji grada Smedereva za period 2008-2013*). A dominant part of agricultural production in Smederevo is in family agricultural holdings. According to the Census of Agriculture of 2012, a total of 7,107 agricultural holdings was registered on the territory of Smederevo with 26,560 ha of utilised agricultural area. There were 7,075 family agricultural holdings, and only 32 legal entities with 92 employees. There are 3,886 of registered agricultural holdings, of which 99.51% are family agricultural holdings, and 0.49% are legal entities and entrepreneurs. In accordance with the data in tables 3 and 4 the structure of used agricultural land of holdings is: farmstead – 172 ha; plough land and gardens – 20,514 ha; meadows and pastures – 1,077 ha; orchards – 4,412 ha; vineyards – 381 ha; nursery beds – 3 ha; other – 1 ha.

Table 3. Used agricultural area of holdings by categories

Region Area City-municipality	AH	UAA total ha	Farmstead		Plough land and gardens		Meadows and pastures	
			PG	ha	PG	ha	PG	ha
Danube area	18,800	73,336	10,525	645	16,858	61,799	3,739	3,855
Velika Plana	5,225	18,994	3,344	210	4,860	17,481	423	777
Smederevo	6,877	26,560	3,149	172	5,708	20,514	1,008	1,077
Smederevska Palanka	6,698	27,782	4,032	262	6,290	23,803	2,308	2,001

Source: RZS, 2012a.

Table 4. Utilised agricultural area of holdings by categories

Region Area City-municipality	Steady plantations							
	orchards		vineyards		nursery beds		other	
	PG	ha	PG	ha	PG	ha	PG	ha
Danube area	6,813	6,294	3,198	729	10	8	11	6
Velika Plana	1,370	398	750	126	-	-	4	1
Smederevo	2,912	4,412	1,313	381	3	3	2	1
Smederevska Palanka	2,531	1,484	1,135	221	7	5	5	5

Source: RZS, 2012a.

The data in table 5 shows that in this category the most represented are: cereals (16,747 ha), forage crops (2,035 ha) and industrial crops (793 ha). Table 6 shows that in areas under cereals what dominated was grain maize (8,340 ha), wheat and spelt (7,202 ha) and barley (1,016 ha). On the other hand, table 7 shows that beans are registered as the most represented legume on 23 ha. Sunflowers grow on 568 ha, or even 71.63% of share in the total areas under industrial crops. In the structure of areas under vegetables, melons and strawberries stand out: pepper (59 ha), cabbage and kale (54 ha), tomato (38 ha), other fresh vegetables (35 ha), me-

lons (166 ha) and strawberries (63 ha). The areas under forage crops are 2,035 ha, and the most represented are lucerne (1,189 ha) and clover (750 ha). Table 8 shows that orchards occupy 4,412 ha, where there are plantation orchards (4,234 ha) and extensive orchards (178 ha). Vineyards occupy the area of 381 ha, of which: (1) varieties for wine with geographic origin on 27 ha; (2) other wine varieties on 204 ha; and (3) varieties for eating on 150 ha. Regarding areas under fruit species, the most represented are peaches (1,961 ha), apples (1,340 ha) and plums (333 ha) (RZS, 2012).

According to the analysis of the AESS (Agricultural Extension and Specialised Service), Smederevo shows a permanent upward trend in areas under fruit cultures. According to the situation on the ground it can be concluded that this production shows, more or less, an increasing trend of production areas depending on fruit species. However, the analysis shows the visibly continuous decrease in areas under vineyards on the territory of the city of Smederevo. As for the assortment of Smederevo vineyards, the most represented variety is Smederevka. There are also the following varieties: Italian Riesling, Zupljanka, Chardonnay, Eden Riesling, Sauvignon (white grape varieties), Vranac, Merlot, Muscat Hamburg, Cabernet Sauvignon (red grape varieties). It is inevitable zoning through the stimulating measures, first of all, subsidies. Sumadija region of Smederevo should stimulate: vine growing and stone fruits (peach-nectarine, apricot, etc.), and Morava region: strawberry, apple, plum, etc. Accordingly, it is necessary to invest in irrigation and infrastructure in the field of power supply.

Table 5. Plough land and gardens

Region Area City-municipality	AH	Plough land and gardens, ha										
		Total	Cereals	Legumes	Potatoes	Sugar beets	Industrial crops	Vegetable, melons and strawberries	Flowers and ornamental plants	Forage crops	Other crops	Fallow land
Danube area	16,858	61,799	48,681	120	105	3	2,257	760	5	8,904	31	931
Velika Plana	4,860	17,481	13,829	31	36	0	631	226	1	2,377	8	341
Smederevo	5,708	20,514	16,747	26	56	2	793	446	2	2,035	7	398
Smederevska Palanka	6,290	23,803	18,105	63	13	1	833	88	1	4,492	16	192

Source: RZS, 2012a.

Table 6. Areas under cereals

Region Area City-municipality	AH	Cereals, ha							
		total	wheat and spelt	rye	barley	oats	grain maize	Other cereals for grain maize	
Danube area	15,607	48,681	20,487	73	3,564	696	23,553	307	
Velika Plana	4,507	13,829	5,829	21	985	184	6,753	57	
Smederevo	5,181	16,747	7,202	38	1,016	66	8,340	85	
Smederevska Palanka	5,919	18,105	7,456	14	1,563	447	8,461	165	

Source: RZS, 2012a.

Table 7. Areas under legumes

Region Area City-municipality	AH	Legumes, ha			
		total	peas	beans	other legumes
Danube area	469	120	53	52	15
Velika Plana	99	31	8	16	7
Smederevo	216	26	2	23	2
Smederevska Palanka	154	63	43	13	6

Source: RZS, 2012a.

Table 8. Orchards and vineyards

Region Area City-municipality	AH	Orchards, ha			AH	Vineyards, ha			
		total	plantation	extensive		Total	wine varieties with geographic origin	other wine varieties	varieties for eating
Danube area	6,813	6,294	5,488	806	3,198	729	50	414	265
Velika Plana	1,370	398	169	228	750	126	22	67	37
Smederevo	2,912	4,412	4,234	178	1,313	381	27	204	150
S.Palanka	2,531	1,484	1,085	399	1,135	221	1	143	77

Source: RZS, 2012a.

Once, the enterprise Godomin had been significant in the field of the primary agricultural production, as a carrier of fruit production in Smederevo, but now, the company is in bankruptcy. The export of fruit was dominantly oriented to the Russian market, through several brokerage companies. Before they exported, the products went through phytosanitary control, which includes a visual inspection of fruit to quarantine diseases caused by pests. During preparations of fruit for shipment, AESS Smederevo controls it and issues the phytosanitary certificates. In the field of livestock production, there is no export, though. The most represented cattle breed is Simmental. At the same time, bee keeping is the branch of livestock breeding where an increasing trend can be noticed. There is also an association of beekeepers.

As for agro-industry, the enterprise Godomin was also once significant. It was engaged in the production of wine and brandy. Today, a small number of enterprises have survived in this field. By their significance, the companies "Ishrana" and "Fruvita" single out. "Ishrana" is engaged in the production and sale of bakery products with the additional commercial range (<https://ishrana-smederevo.ls.rs/rs/>). "Fruvita" is the company dealing with fruit processing, the production of juices, nectar and non-alcoholic beverages with fruit juice (<http://fruvita.com/o-kompaniji/fruvita-danas/>). The company's headquarters are in Belgrade, and the "Fruvita" factory for juice production is in the village of Lunjevac (Smederevo). The company owns also the relocated section in the village of Kolari (Smederevo), where is the production line for fresh fruit processing and the production of squeezed juices. The

company in Smederevo employs around 80 workers, but this number varies depending on season and the need for fruit processing. In the Smederevo area, apple is the most purchased fruit. The company “Fruvita” exports its products to the markets of surrounding countries: Montenegro, Bosnia and Herzegovina and Macedonia. A number of subjects engaged in agricultural products processing, like wineries, slaughter houses, mills, etc. is registered in the sector of SMEs.

The important factor of agricultural production improvement in Smederevo is the Fund for Agricultural Development (Official Gazette of the City of Smederevo, no. 3/2014). It was founded in order to make conditions for motivation, preservation, improvement and development of agriculture on the territory of the city of Smederevo. The fund’s resources use subsidies and credits for: (1) improvement and development of livestock, crop-vegetable, fruit-wine production; (2) construction and purchase of irrigation system; (3) purchase of agricultural means of mechanisation; (4) insurance of yields and crops; (5) construction of facilities and purchase of equipment for improvement of sale (cold storages and driers, storages) and other purposes. This creates the possibility that certain number of commercially development-oriented holdings grow into small- and medium-sized enterprises (the so-called SMEs sector). A small number of SMEs in the field of agriculture and processing reflects the unfavourable economic environment for the establishment and operation of this sector (high taxes, off-tax burdens, administrative taxes, reimbursements and other costs, etc.).

Consequently, the city of Smederevo can observe its further development through directing resources and support to agricultural producers in founding associations, cooperative associations, increasing the areas under fruit plantations, vineyards, vegetables and crops as well as through the stimulation of irrigation and the sale of consumer goods (*Strategija lokalnog ekonomskog razvoja period 2009-2014 godine*).

Transfer of knowledge and innovation

The current system of knowledge and innovation transfer is efficient and does not follow sufficiently the accelerated technical and technological changes. Knowledge does not treasure systematically and it is difficult to approach to adequate information at the local level. The quality of equipment and techniques for research in Serbia is considered to lag behind the European average. Although, the existing scientific and educational institutions have relatively high quality personnel, who achieved a series of internationally recognised results: new sorts and breeds, scientific papers and technical solutions (IPARD II programme for Serbia, 2014).

Accordingly, in Serbia the transfer of knowledge in the field of agriculture is conducted through the system of formal education at all levels (from secondary education to PhD studies), by different forms of trainings organised by the edu-

cational and research institutions and organisations, AESSs, private companies, project units, media, etc. (*Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014-2020 godine*). Smederevo, as the industrial town, is a town which wants to create a positive business climate and therefore to be recognisable in the region, and also wants to be the knowledge incubator and a part of Serbia, which changes its image (*Strategija lokalnog ekonomskog razvoja period 2009-2014 godine*).

In the sector of agri-business the education and consulting represent the significant factors of business modernisation. In support of this argument it should be mentioned that investing in consulting (and agricultural research) brings around 40% of the average earnings rate, which is “much more than other investments in agricultural development” (Van den Ban, Hawkins, 1996). Improving the managerial abilities and skills can be achieved by top quality training and education. A good training and advice to agricultural producers are some of the most useful models of support provided by the government.

The basic institutions in Smederevo for transfer of knowledge and innovation in agriculture are:

- Agricultural extension and specialised service Smederevo d.o.o. (in Kolari),
- Textile-technological and agricultural school “Despot Djurdj”, Smederevo.

The agricultural extension and specialised service of Smederevo follows intensively 230 selected agricultural holdings, and 500 other agricultural holdings is involved in the consulting system in some other ways, mostly through participation in the group lessons and through occasional visits of consultants to agricultural holdings. This service does its activity in the area of four municipalities: Smederevo, Smedevska Palanka, Velika Plana and Grocka, which occupy the area of 1,537 ha, covering 73 settlements inhabited by ca. 286,903 people, who own 122,244 ha of agricultural land, of which 98,840 is plough land, 13,227 ha are orchards, 4,106 ha are vineyards and 6,071 ha are meadows (<http://psss.rs>). The agricultural specialised service has two organisational entities: Specialised Service with laboratories and the Specialised Service for administrative and financial activities. According to the same source, the basic tasks of the agricultural professional service are:

- Consulting activities aiming to raise the knowledge of agricultural producers in application of the appropriate technology in growing plants and breeding animals in selected agricultural holdings;
- Education of agricultural producers in the form of: direct or indirect recommendations and expert advices; organising and lecturing seminars, winter schools and workshops; issuing professional publications as well as other forms of public information (brochures, bulletins);
- Introduction of new varieties of hybrids of agricultural crops and breeds of domestic animals as well as the introduction of modern technology;

- Informing agricultural producers on the agrarian policy measures and the support in realisation of certain rights;
- Support in establishment and work of associations and rural social groups;
- Monitoring and reporting on the seasonal agricultural works;
- Forecasting and reporting activities.

There are 1,405 of holdings, which have used the services of the extension service in Smederevo (RZS, 2012b). By settlements, the holdings which used the extension services the most were registered in Mihajlovac (166), Drugovac (102), Suvodol (100) and Dobri Do (90). The transfer of knowledge and innovation would be probably better if farmers would use more computers and the Internet. That is to say, the data of the census showed that only 151 holdings were using the computer.

The textile-technological and agricultural school “Despot Djuradj” Smederevo is one of the youngest in the territory of the Republic of Serbia. The school was founded in 1991, and today it educates pupils within the three fields (<http://www.despot.edu.rs>):

- Agriculture, production and processing of food (veterinarian technician, agricultural technician, food technician, producer of food products, baker and butcher);
- Chemistry and non-metals (technician for the environment protection, chemical-technological technician);
- Textile and leather industry (technician – clothing model constructor, fashion tailor – experiment).

The research papers (projects and studies) can be used as an adequate substitute for evaluation of development of knowledge economy according to the sectors and the territory. The data in table 9, observed at the Republic of Serbia level, have shown that the highest value (in thousands of RSD) in 2012 had the research papers of applied character and then the fundamental and developmental papers. As for a number of scientific papers, there is a total of 11,493 papers, of which 6,413 are fundamental papers, 2,955 are applied papers and 2,085 are developmental papers.

In the region of South and East Serbia, the value of the total research papers is RSD 1,140,410 thousand, and it divides between RSD 11,268,009 thousands (fundamental), RSD 13,663,698 thousand (applied) and RSD 7,485,203 thousand (developmental). The confirmation of the knowledge economy requires more investments in the fundamental research. However, a long-term crisis of domestic economy has led to the reduction of accumulative capability of enterprises in the region of South and East Serbia, as well as in the Danube region and Smederevo. In these conditions, the country lacks both the critical mass of resources necessary for organising the research process and the readiness to overtake the financial

risks, associated with these processes. Unpretentious profitability of enterprises represents the reason for the reduced investments in the research-developmental activity. Consequently, there is a reduced ability of an enterprise to increase their own capital, based on the financial leverage, i.e. the difference between profit and interest rate.

Table 9. Research papers (projects and studies) according to sectors and territory, 2012

	Research papers (projects and studies) according to sectors and territory, 2012							
	Value of scientific papers, RSD				Number of scientific papers			
	total	fundamental	applied	developmental	total	fundamental	applied	developmental
REPUBLIC OF SERBIA	32,416,910	11,268,009	13,663,698	7,485,203	11,493	6,413	2,995	2,085
<i>Non-financial sector</i>	8,115,127	119,194	6,102,871	1,893,062	682	55	455	172
<i>Government sector</i>	9,259,614	4,045,768	3,508,770	1,705,076	3,763	2,219	958	586
<i>High education</i>	15,021,970	7,100,631	4,044,799	3,876,540	7,011	4,134	1,561	1,316
<i>Non-profit sector</i>	20,199	2,416	7,258	10,525	37	5	21	11
SERBIA-NORTH	30,251,695	10,464,894	12,868,714	6,918,087	9,526	5,302	2,455	1,769
<i>Non-financial sector</i>	7,835,778	117,919	5,993,782	1,724,077	513	54	319	140
<i>Government sector</i>	8,990,908	4,036,795	3,309,592	1,644,521	3,710	2,217	942	551
<i>High education</i>	13,404,810	6,307,764	3,558,082	3,538,964	5,266	3,026	1,173	1,067
<i>Non-profit sector</i>	20,199	2,416	7,258	10,525	37	5	21	11
Belgrade region	24,387,641	8,066,683	10,509,696	5,811,262	7,285	4,486	1,661	1,138
<i>Non-financial sector</i>	7,762,942	117,919	5,920,946	1,724,077	501	24	307	140
<i>Government sector</i>	8,413,738	4,010,970	2,802,151	1,600,617	3,546	2,207	805	534
<i>High education</i>	8,198,080	3,935,641	1,781,599	2,480,840	3,220	2,221	538	461
<i>Non-profit sector</i>	12,881	2,153	5,000	5,728	18	4	11	3
Vojvodina region	5,864,054	2,398,211	2,359,018	1,106,825	2,241	813	794	
<i>Non-financial sector</i>	72,836	-	72,836	-	12	-	12	-
<i>Government sector</i>	577,170	25,825	507,441	43,904	164	10	137	17
<i>High education</i>	5,206,730	2,372,123	1,776,483	1,058,124	2,046	805	635	606
<i>Non-profit sector</i>	7,318	263	2,258	4,797	19	1	10	8
SERBIA-SOUTH	2,165,215	803,115	794,984	567,116	1,967	1,111	540	316
<i>Non-financial sector</i>	279,349	1,275	109,089	168,985	169	1	136	32
<i>Government sector</i>	268,706	8,973	199,178	60,555	53	2	16	35
<i>High education</i>	1,617,160	792,867	486,717	337,576	1,745	1,108	388	249
Sumadija and West Serbia Region	1,024,805	503,041	360,578	161,186	660	359	210	91
<i>Non-financial sector</i>	100,907	-	72,072	28,835	140	-	123	17
<i>Government sector</i>	36,217	7,243	28,974	-	5	1	4	-
<i>High education</i>	887,681	495,798	259,532	132,351	515	358	83	74
SOUTH AND EAST SERBIA REGION	1,140,410	300,074	434,406	405,930	1,307	752	330	225
<i>Non-financial sector</i>	178,442	1,275	37,017	140,150	29	1	13	15
<i>Government sector</i>	232,489	1,730	170,204	60,555	48	1	12	35
<i>High education</i>	729,479	297,069	227,185	205,225	1,230	750	305	175
Region of Kosovo and Metohia

Source: RZS, 2013.

Improving the transfer of knowledge and innovation in agriculture of Smederevo requires the constitution of market-oriented enterprises with highly educated personnel, which implies a series of structural changes, directed to improvement of the business efficiency and adjustment to the market requirements. The structural changes within an enterprise are based on the internal orientation, which resulted from the improved efficiency or the external orientation focused on the effectiveness improvement. Successful positioning on the agricultural products' market requires timely information on changes in the environment, and first of all, in the market in order to reduce risk and

uncertainty. It is necessary to stimulate more important partnership between the public and the private sector, primarily in the form of intra-sector and inter-sector mobility of researchers, professors and consultants. Troubleshooting the existing business issues, regarding agricultural producers, enterprises and associations in Smederevo, requires the interdisciplinary approach, since there often appear the unstructured business problems, where the routine solutions cannot be applied. Consequently, it is inevitable to: (1) decentralize and (2) network educational, scientific-research and consulting capacities. The regional exchange of professors, researchers, consultants and other interested actors is inevitable. The regional exchange of experts in conditions of insufficient intellectual capital would lead to an optimal allocation of human resources of the neighbouring regions and municipalities.

It can be concluded that the existing structure and the system of knowledge transfer are not sufficiently efficient and do not manage to meet adequately the needs for more dynamic technical-technological restructuring of agricultural sector (*Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014-2020*). Also, the possibilities provided by the private-public partnerships within the purview of creating and transferring knowledge and technologies, as well as the greater involvement of other actors (cooperative associations, private consulting economic entities and agencies, NGO sector and others) have not been used (*Strategija poljoprivrede i ruralnog razvoja Republike Srbije za period 2014-2020 godine*). Transfer of knowledge and the information activities should not realise only in the form of traditional lectures, but they should adjust to the needs of subjects in rural areas. Therefore it should support the workshops, conferences, demonstration activities, information activities and the programmes of short-term exchange or visit to the agricultural holdings (Regulation, 1305/2013).

A need for creating the machinery rings in rural area of Smederevo

In the past few decades, rural population in Serbia differentiated and stratified, as a main carrier of agricultural production (RZS, 2012c). The above-mentioned research showed that there were some producers with more economic power, which enabled them to follow the modern technological achievements, regarding the use of the new equipment, and regarding the new technologies use. In the second group are those poorer, without sufficient resources for the serious change, and this is the majority in Serbia.

The problems of agricultural producers in Smederevo regarding the agricultural mechanisation are identical to those problems of agricultural producers in the area of the entire Republic of Serbia, and the most important of them are the following:

1. Unit strength, structure and lifetime of the current means of mechanisation in some branches of agricultural production are devastating. Technologically obsolete and unreliable, the current machinery park can seriously threaten this

branch, especially in protection of grown cultures in all forms of agricultural production (RZS, 2012c).

2. Very expensive bank loans (high interests) for purchase of new means of mechanisation.
3. Absence of cooperation among farmers in using the mutual means of mechanisation (underdeveloped the so-called machinery rings), by which the mechanisation costs would significantly reduce, and increase the economic effects.

The accelerated replacement of the current machinery is the only way to stabilise it and to increase yields per an area unit. Proper use of a new, and a good selection of agricultural technology, which follows from the modern scientific achievements contributes to the reduction of agro-technical deadlines for construction, but also reduces the energy inputs (RZS, 2012c). The modern agricultural production in Smederevo cannot be achieved without the productive machinery, and a basic condition for such machine use is to provide employment, good work organisation, training of operators and clearly defined relations. The machinery ring provides to its members all these advantages. In highly developed countries, the advantages of this type of organisation are used, and they encourage the work of machinery rings, while the related services are not taxable and they are considered as the arranged production.

This approach to the problem of land cultivation has led to division of farmers into two basic categories: (1) those who need services and (2) those who provide the services. Such differentiation has led to creation of groups of service providers, who are narrowly specialised only in specific operations, so the quality of provided services is high. At the same time, the price of the services provided in this way is lower, by maximum exploitation of means of mechanisation. On the other hand, the providers of services can devote themselves to some other problems in their agricultural production (inputs, sale of products), and not to be burdened by their “unused” means of mechanisation. Taking into consideration the dispersion of necessary equipment and mechanisation in Smederevo, by creating the machinery rings, there would be more efficient production due to more rational use of the existing resources, whereby it would simultaneously achieve economy of scale and economy of scope.

The network economy is the new entrepreneurial organisational-process model, which develops with support of the basic mass elements (information, innovation, communications, new technologies, etc.). It significantly changes the international trade performances and competition in general. Networking does not appear as a substitute of traditional hierarchical-bureaucratic organisational-management structure, but as a new management strategy, even a paradigm, used by many world (especially) global enterprises, which base their success and development on the modern structuring of business processes. The networking improves the abilities of adjustment to changes, innovativeness, modernisation

and training in regard to hierarchical-bureaucratic organisational structure. Besides, the strategic management of network organisations enables the reduction of costs, increase in profit and better reaction to the market conjuncture change. The practice has shown that networking of organisational structures, business processes, scientific-educational work results with the key knowledge, skills and other advantages, which valorise on the market as competitive. The networked partners in business processes more and more often use mutually their key competences, aiming to achieve faster, cheaper, more flexible, better quality results, by which the competitive advantage in the global market is made.

Restructuring of agricultural enterprises and creating a new sector in Smederevo

According to data of the Agricultural Extension and Specialised Service Smederevo, there are insufficient industrial capacities for processing of agricultural products, so it is of great importance to stimulate their foundation. Namely, in Smederevo only 9 companies operate in the agro-industry. On the other hand, there are 3,886 of registered agricultural holdings, of which only 0.49% is legal entities and entrepreneurs. Some of the well-known companies are AD “Ishrana” and “Fruvita”.

AD “Ishrana” Smederevo was founded in 1950 as the independent enterprise and it is located in the centre. The basic activity of the enterprise is production and sale of bakery products with the additional commercial range (<http://ishrana-smederevo.rs/rs>). Since 2000, “Ishrana” has introduced and maintained the system of quality management according to the requirements of the JUS ISO 9001:2001 standard, and since 2005 the HACCP food safety system (Hazard Analysis and Critical Control Point). The factory “Fruvita” is located in the village of Lunjevac, in the vicinity of Smederevo. The company owns also the relocated section in the neighbouring village of Kolari. “Fruvita” is the company which is engaged in fruit processing, production of juices, nectars and non-alcoholic beverages with fruit juice. It exports the products to the markets of surrounding countries: Montenegro, Bosnia and Herzegovina and Macedonia. After the bankruptcy of “Godomin”, the processing industry in Smederevo has significantly lost in processing of grape and production of wine and brandy, so they should invest in fruit processing, mini-dryers, cold storages, in production of natural juices, homemade jams and dried fruits.

Insufficient number of small- and medium-sized enterprises and entrepreneurs in the field of agriculture and processing points out to still unfavourable business environment for establishment and work of this sector. In the sector of small- and medium-sized enterprises and entrepreneurs a number of subjects engaged in the processing of agricultural products, like wineries, slaughter houses, mills, etc., is registered. In the field of agricultural products processing, except the above-mentioned companies (Ishrana and Fruvita), there are the following processing capacities:

- Dairy JTL Zlatiborac DOO Mihajlovac has the main activity in the processing of milk and the production of cheeses. The most important products in the company's production range are: pasteurised milk, yoghurt and sour cream. "Imlek" and "Granice" cooperate with big milk producers on the territory of the city of Smederevo, i.e. they purchase milk from them.
- "Curan" slaughter house in Mihajlovac is engaged in the production and sale of meat and meat products.
- Chicken slaughter house "Bajan" in Mihajlovac processes poultry and it owns its own farms for breeding and fattening of poultry (<http://bajan.co.rs>). They also supply retail companies and shops and they plan to launch meat processing plants in the future.
- Slaughter house and meat industry "Nedeljkovic" in Sasinci produces fresh pork, beef, veal, mutton, as well as over fifty different types of durable and semi-durable top-quality meat products, by the most famous recipes (<http://www.nedeljkovic.co.rs>).
- Compost factory "UCA" d.o.o., using the modern equipment, produces today approximately 1,600,000 briquettes per year. The homogenous quality and quantity of compost in briquette provides good yields and good quality of champignons (<http://ucadoo.com>).
- "JAS Holding Kolari" – DOO for the production of refreshments, mineral water and other bottled water.
- "PTC Germany" is the company for fish processing – town hall built by the municipality Smederevo is rented out to the German firm "PTC Germany", engaged in the processing of saltwater fish and seafood.

Taking into consideration the insufficient industrial capacities for the processing of agricultural products, it is necessary to support development of new processing processes according to the disposable strategic raw materials and the market requirements. It can be achieved by investments in production, marketing and introduction of the quality system in accordance with the EU standards. It is inevitable to foresee working out of the production programme based on the modern technology application, which would comprise all phases of the reproduction totality, starting from the primary production, through the industrial processing and turnover to the consumption of all substantial agricultural products. As a result, it is necessary to support the investments directed to increase in small- and medium-sized enterprises in Smederevo with market-propulsive and export programmes of agricultural production.

Accordingly, the agricultural enterprises of Smederevo must make significant changes in order to get out of the economic crisis. Restructuring can be defined as an activity, which realises in an enterprise with decreasing performances, in order for an enterprise to survive and turn into the profitable business. Restructuring in our conditions must comprise all fields of enterprises' operations in Smederevo. It implies that it has to be realised as the ownership, market, organisational, busi-

ness and financial transformation. There is a large number of individual changes and interventions, which can be carried out in every enterprise, aiming to improve the business results. When the enterprises' performances cannot be evaluated as satisfying, some changes are necessary in organisation, composition of activities, assets of an enterprise and its financial structure, etc.

The need for restructuring makes a demand for staff that would be the carriers and actors of economic changes. A paradox called "the personnel paradox" appears in practice. That is to say, it is necessary to do the personnel restructuring in the most of enterprises in Smederevo, which mostly implies decreasing the number of employees, and simultaneously with insufficient professional personnel. At the same time, the employers would employ gladly the top-quality highly-educated personnel, because they know that the potential benefits of their engagement are far above the expenses for their salaries.

Creating the business-attractive enterprises initiates the need for the staff in the field of entrepreneurship and agriculture. The personnel is necessary to make a contribution to enterprises in realising their goals, solve the problems regarding business and management, identify and use new possibilities, increase their knowledge and apply the acquired knowledge practically. In domestic economy, there is a lack of knowledge in the field of business planning, which is inevitable for creating small- and medium-sized enterprises. We can define the essence of the necessary changes as a new entrepreneurial society, which encourages taking over the risks and making new entrepreneurial skills.

Every dimension of an enterprise's restructuring is specific and it requires the professional expertise and experience of the personnel (Mihailovic, 2007):

- Ownership restructuring represents the privatisation of domestic enterprises, which results in transformation of the national and public capital into the equity capital. In this phase of restructuring, the consultants are engaged in activities before and after the privatisation. In pre-privatisation activities, the focus is on the preparation of an enterprise to enter the privatisation process and to sell successfully. In after-privatisation activities, it is important to take account of the defence measures from taking over the privatised enterprises as well as the application of appropriate management concepts of joint-stock form of organisation.
- Market restructuring is redefining the market in which the enterprise appears, aiming to improve sale and business. For successful market restructuring, it is necessary to dispose with adequate information on changes in surroundings, and first of all, in order to decrease risk and uncertainty. Numerous enterprises in the Danube region treats the projects of market research as a great or unnecessary cost, since they consider that they already know their consumers' needs, i.e. they know well the market. However, the increasing number of enterprises is familiar with the increasing significance of market research and

- they approach it with the scientific approach or they leave it to the specialised institutions (consulting houses, marketing agencies, institutes, etc.). The market research enables the enterprises to solve the business problems efficiently.
- Organisational restructuring represents change of an organisational model of enterprise and a conception of operation. It is necessary to make an analysis of organisation, create the intervention strategy, than to make a report, organise meetings, etc. Special teams of experts engage to give a state diagnosis in the organisation. Organisational restructuring is an interdisciplinary field. Consequently, the change agents, the organisation leaders, but primarily the managers and consultants, must have the skills in different fields, especially in human behaviour.
 - Business restructuring results in significant changes in an enterprise's activities. The changes are mostly focused on the following fields: termination of one type of job and opening the others, fusion and merging of enterprises, making business plans, interventions in the field of production and technology. The goal of all interventions is to increase the economic value of a firm and to improve its negotiating power in the market. For successful business restructuring it is necessary to analyse different forms of market and products mix as the basic potentials for an enterprise growth. As regards, the market restructuring is the premise for business restructuring of enterprises.
 - Financial restructuring implies the change in structure of capital, which changes the relationship between ownership and debt. Domestic enterprises have a disturbed financial balance, inadequate export structure of resources as well as a high indebtedness. In non-privatised companies, the financial restructuring refers to the share operations. In previous practice, the main subjects in these activities are: a candidate for emission, the Commission for Securities, warrantor (or investment bank), a certified auditor and various types of consultants.

In terms of the domestic accumulation, shortage and increasingly less inflow of foreign direct investments, due to the global financial crises, there is a natural and logical conclusion that the rural development in Smederevo should be based on self-employment and the so-called internal entrepreneurship. Consequently, by the diffusion of these skills in commercial agricultural holdings, there is the possibility of these holdings transformation into small- and medium-sized enterprises in the field of agri-business.

Conclusion

With profiling the expert staff in this field, the agriculture would provide a significant contribution to economic development of the Danube region. Due to its connection and impact on other sectors, it is very important for development of Serbia, considering that it employs, directly or indirectly, numerous people,

participates significantly in foreign trade, ensures food safety of population, and contributes to rural development and ecological equilibrium.

Agriculture in Serbia faces many problems, which cover, e.g., the results of the limitations existing in the conditions of economic environment and agrarian policy pursued in the period after the WWII until the SFRY breakdown, difficulties in the past 15 years and difficulties in adjustment to the market economy. The agriculture in Serbia has been encumbered by the consequences of the centrally planned economy as regards to ownership and land use. It is necessary for development policy, which can impact the increase of productivity by restructuring and investments, which implies clear proprietary rights and forming the efficient land market, credits and inputs necessary for agricultural enterprises.

Having in mind all natural predispositions and directions of further development of Smederevo, the need for education of highly-qualified personnel in the fields of entrepreneurship and agriculture has arisen. That is to say, the personnel significantly affects the pace of the economic growth and development as producers, consumers, but also recently as managers. An important component of a unique treatment of personnel is their participation in management, regarding their interest in better business results.

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