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Научно друштво аграрних економиста Балкана, Београд
The Balkan Scientific Association of Agrarian Economists, Belgrade
Институт за економику пољопривреде, Београд (Србија)
Institute of Agricultural Economics, Belgrade, (Serbia)
Академија економских наука, Букурешт (Румунија)
Academy of Economic Studies, Bucharest (Romania)

Адреса уредништва / Editorial office
Београд, Волгина 15; тел/факс (+381)11/6972-848; E-mail: economicsofagriculture@ea.bg.ac.rs
Belgrade, Volgina 15; phone/fax (+381)11/6972-858; E-mail: epoljoprivrede@gmail.com

http://ea.bg.ac.rs

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CONTENT

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PROMOTION OF ORGANIC FOOD IN SERBIA: IMPLICATIONS FROM ORGANIC FOOD CONSUMERS' PROFILE RESEARCH

Ines Đokić[1], Nenad Đokić[2], Nataša Pavlović[3], Ružica Kovač Žnideršić[4]

Summary

The article presents the results of the research of organic food frequency of consumption (in general), conducted in Serbia in June 2013 (n=300). Respondents were classified into low-frequent organic food consumers' segment and high-frequent organic food consumers' segment. Socio-demographic characteristics of respondents were also investigated, thus allowing comparing two segments regarding consumers' profile. The organic food high-frequent consumers' segment consisted of more women, more educated people, more married respondents and respondents living with children and having larger households, as well as of consumers with higher self-assessed household income in comparison to organic food low-frequent consumers' segment. Having in mind the results of the research and the level of domestic market development when choosing which segment to target, as well as starting from understanding promotion in the context of integrated marketing communication and the means-end approach to consumer behavior, recommendations for organic food promotion were given.

Key words: *organic food, market segmentation, marketing management, promotion, Serbia.*

JEL: *M30, M31, M37*

Introduction

Despite having satisfying natural preconditions for growing organic food (Vlahović, Štrbac, 2007), the production of organic food and development of this food market in Serbia can be described as modest (März et al., 2012) and there are contradictory prognosis regarding future level of acceptance of organic food by domestic consumers. On one hand, there are

1 Ines K. Đokić, M.Sc., Teaching Assistant, University of Novi Sad, Faculty of Economics Subotica, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 24 628 133, E-mail: mines@ef.uns.ac.rs

2 Nenad S. Đokić, M.Sc., Teaching Assistant, University of Novi Sad, Faculty of Economics Subotica, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 24 628 217, E-mail: djokicn@ef.uns.ac.rs

3 Nataša Đ. Pavlović, M.A., Turistic Organization of Vojvodina, Bulevar Mihajla Pupina no. 6, 21000 Novi Sad, Serbia, Phone: +381 21 452 910, E-mail: nts.pavlovic@gmail.com

4 Ružica S. Kovač Pečkai Žnideršić, Ph.D., Full Professor, University of Novi Sad, Faculty of Economics Subotica, Segedinski put no. 9-11, 24000 Subotica, Serbia, Phone: +381 24 628 134, E-mail: znikor@ef.uns.ac.rs

authors who believe it is not to be expected organic food to be increasingly accepted by domestic consumers (Maslac, 2009; März et al., 2012), explaining that their thesis can be supported by the facts that Serbian GDP per capita increased for two times in period from 1999 to 2009 while food prices increased for nine times in the same period, as well as by the facts that average monthly income in Serbia is less than 400 USD and consumers are unwilling to pay premium price of 30 to 40% for organic food. On the other hand, there are authors who point out that it can be expected that organic food will be mostly bought by more educated consumers and consumers taking care about their own health and consequently this food will become part of daily food consumption, while its premium price will not present barrier for it (Renko et al., 2011).

Nevertheless, domestic organic food consumers are crucial as first impulse motivating domestic farmers to start their organic food production (Kočić Vugdelija et al., 2011). That is why it was needed to research domestic organic food consumers' profile in order to be able to identify effective approaches for targeting them. The importance of this question can be analyzed from the perspective of foreign producers and importers of organic food to Serbia as well, since a number of organic food categories are being imported to domestic market (März et al., 2012).

This paper will present the results of the research of self-reported frequency of consumption of organic food in Serbia followed by data regarding socio-demographic characteristics of respondents, from which low-frequent and high-frequent organic food consumers' segments were derived and their socio-demographic profile described. After researching profile of low-frequent and high-frequent organic food consumers (which belongs to strategic marketing), implications on organic food promotion (belonging to tactical marketing i.e. marketing mix) will be given. Considering the significance of promotion of organic food on emerging markets (Davčik, 2004; Vlahović et al., 2011), as well as having in mind that promotion is in this paper understood in the context of integrated marketing communication and the means-end approach to consumer behavior, given recommendations can be significant for marketing mix as whole.

Theoretical background, literature review and hypotheses development

The steps in marketing management process connecting consumers' profile research (i.e. market segmentation research) and promotion as marketing mix instrument were used as theoretical background of this paper. Namely, Kotler (2007) lists steps in marketing management process: marketing research, strategic marketing (which includes market segmentation, targeting and positioning) and tactical marketing (i.e. creating marketing mix, its implementation and control).

Market segmentation can be defined as the identification of individuals or organizations with similar characteristics, with significant implications for determining marketing strategy (Jobber, Fahy, 2006). Considering final consumer markets, criteria grouped into geographic, demographic, psychographic and behavioral can be used as the basis for segmentation (Kotler, Keller, 2006). In a number of organic food market segmentation

researches behavioral criteria are used as basis for segmentation, followed with the use of socio-demographic criteria as descriptors.

However, there can be identified contradictions regarding the existence and/or direction of different socio-demographic criteria influence when profiling organic food market segments (Bonti-Ankomah, Yiridoe, 2006; Hughner et al., 2007). For example, some researches point out women being more in favor of concept of organic food (Koivisto Hursti, Magnusson, 2003; Lockie et al., 2004; Arbindra et al., 2005; Padel, Foster, 2005) while other researches find no significance of gender when describing organic consumers' profile (Loureiro, Hine, 2002; Sandalidou et al., 2002; Gracia, de Magistris, 2007; Zepeda, Li, 2007). Some researches emphasize older people being organic food consumers (Sandalidou et al., 2002), some point out contrary (Arbindra et al., 2005; Zepeda, Li, 2007; Cicia et al., 2002; Loureiro, Hine, 2002), while some state that age has no relevance when describing organic food consumers' profile (Koivisto Hursti, Magnusson, 2003; Lockie et al., 2004; Gracia, de Magistris, 2007). A number of researches describe organic food consumers as more educated (Zepeda, Li, 2007; Cicia et al., 2002; Sandalidou et al., 2002; Loureiro, Hine, 2002), while some researches point out consumers' education having no significance for organic food consumption (Koivisto Hursti, Magnusson, 2003; Arbindra et al., 2005). Regarding socio-demographic profile of organic food consumers, in some researches positive influence of higher income is emphasized (Loureiro, Hine, 2002; Sandalidou et al., 2002; Arbindra et al., 2005; Gracia, de Magistris, 2007; Stolz et al., 2011) while according to others, consumers' income is not affecting their organic food consumption (Lockie et al., 2004; Zepeda, Li, 2007). There is no single conclusion about the existence and/or direction of influence of family life-cycles phase, marital status, household size and presence of children in family in describing organic food consumers' profile as well (Loureiro et al., 2001; Cicia et al., 2002; Loureiro, Hine, 2002; Sandalidou et al., 2002; Padel, Foster, 2005; Zepeda, Li, 2007; Stolz et al., 2011).

There are attempts to explain reasons of such contradictions among results of different researches of organic consumers (Bonti-Ankomah, Yiridoe, 2006), but the recommendations for overcoming these problems do not include omitting of the use of socio-demographic variables in these researches. Consumers' socio-demographic characteristics are also implicitly present in the behavior theories related to consumers' food choices: the Theory of Reasoned Action and its later modification the Theory of Planned Behavior Theory (Aertsens et al., 2009).

Some researchers conducted in Serbia until now point out that organic food consumers mostly were at that moment and would be in the future high educated people (Maslac, 2009; Renko et al., 2011), young people (Maslac, 2009; Renko et al., 2011) and women (Maslac, 2009).

Having in mind the modest level of domestic organic food market development and the cited results of researches regarding socio-demographic variables influences in describing organic food consumers profile, as well as starting from segmenting domestic organic food consumers into high-frequent (who consume organic food at least once a week) and low-frequent consumers, following hypothesis have been proposed:

- H1: There can be identified high-frequent organic food consumers' segment in Serbia.
- H2: High-frequent organic food consumers' segment is statistically significantly different from low-frequent organic consumers' segment by consisting of larger percent of women.
- H3: High-frequent organic food consumers' segment is statistically significantly different from low-frequent organic consumers' segment by consisting of consumers with lower mean age (younger consumers).
- H4: High-frequent organic food consumers' segment is statistically significantly different from low-frequent organic consumers' segment by consisting of consumers with higher mean rank of education (more high educated people).
- H5: High-frequent organic food consumers' segment is statistically significantly different from low-frequent organic consumers' segment by consisting of larger percent of married respondents.
- H6: High-frequent organic food consumers' segment is statistically significantly different from low-frequent organic consumers' segment by consisting of larger percent of consumers with children in their families.
- H7: High-frequent organic food consumers' segment is statistically significantly different from low-frequent organic consumers' segment by consisting of consumers with higher mean of their household size (consumers with larger households).
- H8: High-frequent organic food consumers' segment is statistically significantly different from low-frequent organic consumers' segment by consisting of consumers with higher mean of self-assessed household income (consumers with higher income).

Continuing description of marketing management process' steps, it should be emphasized that after deciding which of the identified segments to target and how to take a distinctive position in consumers' minds, marketing mix (product, price, place and promotion) is being created, implemented and controlled (Kotler, 2007). Hereby, promotion can be understood in the context of integrated marketing communication concept presenting „theoretical perspective that advocates a high level of communication interaction between a brand's marketers and its consumers coupled with a high degree of message consistency across a brand's entire marketing mix, ranging from the product itself to all marketing communications media" (McGrath, 2010). At the same time, it is possible to consider promotion as well as whole process of consumer behavior according to the means-end approach meaning consumers are not interested in products *per se*, but are interested in them regarding the way the product helps them attain their life values (Reynolds, Olson, 2001).

Since domestic organic food market is in early stages of development, in this paper promotion was suggested in function of targeting high-frequent consumers' and positioning in their minds, considering theoretical background as described above.

Questionnaire

There were two parts of the questionnaire. At the beginning, socio-demographic characteristics of respondents were investigated: gender, age, education, marital status, presence of children in family, the size of the household and self-assessed household income (from 1 - the lowest, to 5 - the highest mark).

The second part of the questionnaire was designed in order to collect data regarding self-reported frequency of consumption of organic food. It was chosen to use organic food in general and not by categories since it is not widely present at domestic food market. The self-reported frequency of consumption was measured by seven-point Likert scale, with meanings: level 1 - never, level 2 – once in several months, level 3 – once in several weeks, level 4 – once a week, level 5 – several times a week, level 6 – every day, level 7 – several times a day.

It took from up to 15 minutes for the respondents to fill in the questionnaire.

Interviewees

The respondents were 20 to 65 years old. There were 300 respondents interviewed in several larger towns of Serbia, in June 2013. The respondents were approached near green markets, large shopping centers and school/university centers attempting to reach average food consumer in Serbia.

In the sample there were 34.0% of male and 66.0% of female. The average respondent was 37.14 years old (standard deviation 12.575). Considering education, 46.0% of respondents had finished secondary school, 19.0% of respondents were attending college or faculty and 35.0% had finished college or faculty. Regarding marital status, 46.7% of respondents were married and 53.3% were single, while regarding children, there were 52.3% of respondents who had not lived in the same household with his/her child/children, while 47.7% had. The average household size was 3 (standard deviation 1.268). Regarding household income, the average self- assessment of it (using 1 as the lowest and 5 as the highest mark) was 2.76 (standard deviation 1.091).

Data analysis

Data analysis was performed by using MS Office Excel and SPSS.

After investigating the self-reported frequencies of consumption of organic food, the respondents were divided into low- and high-frequent consumers in following manner: to low-frequent consumers segment were classified respondents rating they consume organic food never, once in several months or once in several weeks (1, 2 and 3), while to high-frequent consumers segment were classified respondents rating they consume it once a week, several times a week, every day or several times a day (4, 5, 6 and 7).

Analysis was also conducted for investigating whether low- and high- frequent consumers segments were statistically significantly different regarding chosen socio-demographic

characteristics. Pearson Chi-Square test was used regarding gender, marital status and the presence of children in family. Independent samples T-test was used considering age, household size and self-assessed household income. Mann-Whitney U test was used regarding respondents' education.

Results

The results regarding self-reported frequency of consumption of organic food and the size of consumers' segments derived from these data are given in Table 1.

Table 1. Self-reported frequency of consumption of organic food and consumer segments

Self-reported frequency of consumption of organic food	Frequency	%	Consumer segments	%
never	118	39.3	Low-frequent organic food consumers	71.7
once in several months	43	14.3		
once in several weeks	54	18.0		
once a week	42	14.0	High-frequent organic food consumers	28.3
several times a week	35	11.7		
every day	7	2.3		
several times a day	1	0.3		
Total	300	100.0		100.0

Source: Authors' research.

Descriptive statistics regarding two segments' socio-demographic characteristics are given in Table 2.

Table 2. Socio-demographic characteristics of two segments

Socio-demographic characteristics			Low-frequent organic food consumers	High-frequent organic food consumers
gender	male	%	39.10	21.20
	female	%	60.90	78.80
Age		mean (SD)	37.53 (12.868)	36.14 (11.815)
marital status	single	%	60.90	34.10
	married	%	39.10	65.90
presence of children in family	family with no children	%	60.00	32.90
	family with children	%	40.00	67.10
household size		mean (SD)	2.74 (1.217)	3.64 (1.174)
education		median (mean rank)	2 (143.72)	2 (168.41)
self-assessed household income		mean (SD)	2.65 (1.057)	3.06 (1.127)

Source: Authors' research.

The results of Pearson Chi-Square test for gender are: $\chi^2(df=1)=8.691$, $p=0.003<0.05$; for marital status are: $\chi^2(df=1)=17.596$, $p=0.000<0.05$; and for presence of children in family are: $\chi^2(df=1)=17.880$, $p=0.000<0.05$.

The results of the Independent samples T-test for age are: $t(df=298)=0.862$, $p=0.389>0.05$; for household size are: $t(df=298)=-5.772$, $p=0.000<0.05$; and for self-assessed household income are: $t(df=298)=-2.987$, $p=0.003<0.05$.

The results of Mann-Whitney U test, that was used regarding differences in respondents' education between low-frequent organic food consumers (Md=2, n=215) and high-frequent organic food consumers (Md=2, n=85), are: $Z=-2.435$, $p=0,015<0.05$.

Discussion

The results of the research confirmed the first hypothesis that in Serbia there can be identified respondents that consume organic food at least once a week (high-frequent organic food consumers' segment). This segment refers to 28.3% of all the respondents. In general population, this could be even smaller percent since the sample in this research is not fully representative (more educated and younger respondents were more willing to participate in the research). This result is in accordance to other researches' results describing organic food market development in Serbia as modest (März et al., 2012). Some future researches could, in order to get deeper understanding of potential of organic food market in Serbia, besides examining actual organic food consumption, include studying preferences for organic food and obstacles for transforming these preferences into actual consumption as well.

Starting from behavioral criteria (self-reported frequency of consumption of organic food measuring organic food actual consumption) as basis for segmentation, two consumers' segments were identified (low-frequent organic food consumers and high-frequent organic food consumers) and socio-demographic criteria were used as descriptors of these segments, as it is often performed in organic food consumers' researches. Statistical tests confirmed all hypotheses except H3 regarding high-frequent organic food consumers' segment being statistically significantly different from low-frequent organic consumers' segment by consisting of consumers with lower mean age (younger consumers). Although, average age of high-frequent organic consumers is lower than of the low-frequent organic consumers, the statistically significant difference does not exist. This is in accordance to results of some researchers conducted abroad (Koivisto Hursti, Magnusson, 2003; Lockie et al., 2004; Gracia, de Magistris, 2007). However, the results are not fully in accordance to previous researches conducted in Serbia emphasizing young people as organic food consumers (Maslac, 2009; Renko et al., 2011). There can be two explanations regarding such differences. Firstly, these other researches were not focusing only at actual organic food consumption at the time when conducted but also at potential of organic food market. Secondly, in this research high-frequent organic food consumers are younger than low-frequent organic food consumers, but the lack of statistical significance for that difference could be due to the structure of the sample.

As already stated, all other hypotheses were confirmed and statistically significant differences between two segments regarding other socio-demographic variables were established. This implies that there is larger percent of women in high-frequent organic food consumers' segment than in low-frequent organic food consumers' segment. It is in accordance to some

researches in other countries which point out women being more in favor of concept of organic food (Koivisto Hursti, Magnusson, 2003; Lockie et al., 2004; Arbindra et al., 2005; Padel, Foster, 2005) and with one previous research in our country (Maslac, 2009). The results also suggest that high-frequent organic food consumers are more educated than low-frequent organic food consumers, what is consistent with previous researches conducted in Serbia (Maslac, 2009; Renko et al., 2011), as well as with researches conducted in other parts of the world (Zepeda, Li, 2007; Cicia et al., 2002; Sandalidou et al., 2002; Loureiro, Hine, 2002). High-frequent organic food consumers have also higher income (at least they assess their income as higher) in comparison to low-frequent organic food consumers. This is in accordance to results of the researches conducted abroad emphasizing positive influence of higher income on organic food consumption (Loureiro, Hine, 2002; Sandalidou et al., 2002; Arbindra et al., 2005; Gracia, de Magistris, 2007; Stolz et al., 2011).

There is larger percent of high-frequent organic food consumers that are married and living with children in their families in comparison to low-frequent organic food consumers, and they live in larger households as well. This also resembles to the results of some of the researches conducted in other countries (Loureiro et al., 2001; Sandalidou et al., 2002; Cicia et al., 2002; Padel, Foster, 2005; Stolz et al., 2011).

Generally, it can be concluded that organic food high-frequent consumers' segment consists of more women, educated people, married respondents and respondents living with children and having larger households, as well as of consumers with higher self-assessed household income in comparison to organic food low-frequent consumers' segment.

Implications of the results of the research on organic food promotion

Having in mind organic food high-frequent consumers' profile and perception of organic food in the context of potential beneficial influence on health as well as perception that by buying such food consumers help in preserving the nature and have possibility to live according to the nature, which are in accordance to basic principles of organic agriculture, promotion mix will be suggested. It was chosen to target high-frequent organic food consumers considering domestic organic food market being in early stages of development and expecting, according to experience of other countries which were in this phase before, that main impulse for additional organic food demand would come from these consumers.

Advertising should show nature in all its beauty when promoting such products, while the appearance of people in these products' commercials should suggest health, easiness of movement and peace. Children should also take place in such commercials in order to allow suggesting connection of something the most valuable any person has – the family with the pure and strong nature. The advertisement can be performed before, during or after TV programs watched usually by married people with children. For example, the advertisement can be performed in periods before programs about nature broadcasted mostly on weekend day's afternoon. It can also be emitted before or after playing intermezzo program on domestic televisions usually showing natural beauties and playing classical music. Advertisement can also take place before programs speaking about giving birth

or raising babies. The billboards could be placed by the roads to maternity hospitals or hospitals in general, with clear indications where these products can be bought.

Sales promotions of organic food could take place at supermarkets in ambient arranged to remind on nature or green market, with the message, especially addressed to married couples with children, that when buying organic food it is not necessary to know the seller for trusting the quality since these products and their production process are natural *per se*. Marketing public relations should provide journalists information about organic food benefits. Production process should be filmed and shown to journalists or even to broader audience with emphasizing the absence of unhealthy artificial substances in such food and it should be offered them to taste. Hereby, journals (as well as TV programs) should deliver scientific facts regarding organic food to targeted audience since consisting of more educated people and it should be explained to them that by paying premium price of organic food they get the value for their money. Sponsorships of activities such as providing resources for buying incubators for maternity hospitals or apparatus for diagnosis for hospitals are also recommended. Products' visual identity should suggest the freshness and cleanness of ingredients and their distribution could rely on natural products' stores or on separately marked corners of supermarkets. Development of such a promotion mix will be even more important when greater offer of these products will be available and when other actors of the supply chain, more powerful than individual farmers, participate in supply more intensively.

Conclusions

This paper demonstrates the connection between steps in marketing management process: consumers' profile research (i.e. market segmentation research), belonging to strategic marketing, and creating promotion mix (as marketing mix instrument), that belongs to tactical part of marketing. That connection is demonstrated by a number of recommendations stemming from the conducted research referring to organic food, for which promotion is crucial on emerging markets as Serbian is, and which is additionally important because of domestic organic food consumers being a first impulse motivating domestic farmers to start their organic food production.

After the review of the literature and formulating hypotheses, the research was conducted with 300 respondents interviewed in several larger towns of Serbia, in June 2013. The actual food consumption was measured by self-reported frequency of organic food consumption and additional socio-demographic characteristics of respondents were investigated: gender, age, education, marital status, presence of children in family, the size of the household and self-assessed household income. Starting from behavioral criteria (self-reported frequency of organic food consumption) as basis for segmentation, two consumers' segments were identified (high-frequent organic food consumers, consuming organic food at least once a week, and low-frequent organic food consumers). At the same time, socio-demographic criteria were used as descriptors of these segments, as it is often performed in organic food consumers' researches.

The results point out that in Serbia there can be identified high-frequent organic food consumers' segment (28.3% of all the respondents in this sample that is not fully representative). Generally, organic food high-frequent consumers' segment consists of more women, more educated people, more married respondents and respondents living with children and having larger households, as well as of consumers with higher self-assessed household income in comparison to organic food low-frequent consumers' segment.

After performing market segmentation, implications for promotion were considered. It was chosen to target high-frequent organic food consumers having in mind domestic organic food market being in early stages of development and expecting, according to the experience of other countries which were in this phase before, that main impulse for additional organic food demand would come from these consumers. Beside these consumers' profile, perception of organic food in context of potential beneficial influence on health as well as perception that by buying such food consumers help in preserving the nature and have possibility to live according to the nature, which are in accordance to basic principles of organic agriculture, were considered when promotion mix was suggested.

Future researches could, in order to get deeper understanding of potential of organic food market in Serbia, besides examining actual organic food consumption, include studying preferences for organic food and obstacles for transforming these preferences into actual consumption as well. They could also be product specific (this research was related to organic food in general due to early stages of this food domestic market development) and conducted on larger and more representative samples. However, according to the authors' opinion that does not question the importance of tendencies and recommendations stemming from this research.

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PROMOCIJA ORGANSKE HRANE U SRBIJI: IMPLIKACIJE ISTRAŽIVANJA PROFILA POTROŠAČA ORGANSKE HRANE

Ines Đokić[5], Nenad Đokić[6], Nataša Pavlović[7], Ružica Kovač Žnideršić[8]

Sažetak

Članak prikazuje rezultate istraživanja frekvencije potrošnje organske hrane (uopšte uzev), sprovedenog u Republici Srbiji u junu 2013 (n=300). Ispitanici su klasifikovani u segment potrošača koji retko konzumiraju organsku hranu i segment potrošača koji često konzumiraju organsku hranu. Istražene su i sociodemografske karakteristike ispitanika što je omogućilo poređenje profila potrošača dva segmenta. Segment potrošača koji često konzumiraju organsku hranu sastoji se od većeg udela žena, ispitanika u braku, ispitanika koji žive u porodici sa decom, a ti ispitanici su takođe i obrazovaniji, žive u većim domaćinstvima i daju višu ocenu prihodu domaćinstva. Imajući u vidu rezultate istraživanja kao i nivo razvijenosti domaćeg tržišta pri odabiru koji segment targetirati, kao i polazeći od razumevanja promocije u kontekstu integrisanih marketing komunikacija i sredstvo-cilj pristupa ponašanju potrošača, date su preporuke za promociju organske hrane.

Ključne reči: *organska hrana, segmentacija tržišta, marketing menadžment, promocija, Srbija.*

5 Ines K. Đokić, M.Sc., asistent, Univerzitet u Novom Sadu, Ekonomski fakultet u Subotici, Segedinski put 9-11, 24000 Subotica, Srbija, Telefon: +381 24 628 133, E-mail: mines@ef.uns.ac.rs

6 Nenad S. Đokić, M.Sc., asistent, Univerzitet u Novom Sadu, Ekonomski fakultet u Subotici, Segedinski put 9-11, 24000 Subotica, Srbija, Telefon: +381 24 628 217, E-mail: djokicn@ef.uns.ac.rs

7 Nataša Đ. Pavlović, magistar, Turistička organizacija Vojvodine, Bulevar Mihajla Pupina 6, 21000 Novi Sad, Srbija, Telefon: +381 21 452 910, E-mail: nts.pavlovic@gmail.com

8 Prof. dr Ružica S. Kovač Pečkai Žnideršić, redovni profesor, Univerzitet u Novom Sadu, Ekonomski fakultet u Subotici, Segedinski put 9-11, 24000 Subotica, Srbija, Telefon: +381 24 628 134, E-mail: znikor@ef.uns.ac.rs

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FINANCIAL RESULTS ACHIEVED IN SHORT-DAY STRAWBERRY PRODUCTION

Dragan Galić[1], Dušan Milić[2], Zorica Sredojević[3]

Summary

In South-western Ontario's continental climate (short days, hot summers and very cold winters) the matted-row system was the dominant production system to grow short-day strawberries. Varieties-staggered production (planting a combination of early, mid and late-season varieties) provides strawberry harvest from five to seven weeks. Short-day strawberries are vegetative grown in the first year, and harvested for two consecutive years. The total cost of short–day strawberry production was 54,370 $CAD/ha. The production and harvest costs in the first and second years were 20,812 $CAD/ha and 16,930 $CAD/ha, respectively, and accounted for 69.42% of the total. Pre-plans operations were the least expensive procedures costing 8.13%, while planting and care of young plants made up 22.45% of the total costs. The total income of growing short-day strawberries under a matted-row system was 76,671 $CAD/ha (the first and second production years 41,330 $CAD/ha and 35,341 $CAD/ha, respectively). The short-day strawberries in matted-row system, with average yield of 15,722 kg/ha, generated a net revenue of 22,300 $CAD/ha.

Key words: *short-day of strawberry, cost of production, total income, and financial result.*

JEL: *Q12, Q13, P42*

Introduction

Cultivated strawberry (*Fragaria* x *ananassa* Duch.) is a perennial plant, with compressed stem and shallow root system, derived from two North American species *Fragaria virginiana* Duch. and *Fragaria chiloensis* (L) Duch. (Darnell et al., 2003). Based on the volume of world's production, variety of fruits use, uniqueness of aroma and flavor and earliness, strawberries are the most grown small fruit specie. Strawberry is highly prized

1 Dragan Galić, M.Sc., University of Guelph, Department of Plant Agriculture, Box 587, Simcoe, N3Y 4N5, ON, Canada, Phone: 001 519 428 22 45, E-mail: dgalic@uoguelph.ca

2 Dušan Milić, Ph.D., Full Professor, University of Novi Sad, Faculty of Agriculture, Trg Dositeja Obradovića Street no. 8, 21000 Novi Sad, Serbia, Phone: +381 21 485 32 30, E-mail: milic@polj.uns.ac.rs

3 Zorica Sredojević, Ph.D., Full Professor, University of Belgrade, Faculty of Agriculture, Department of Agroeconomy, Nemanjina Street no. 6, 11080 Belgrade, Serbia, Phone: +381 11 2615 315, E-mail: zokas@agrif.bg.ac.rs

since harvest is early in a season (the harvest of short-day strawberries is in following year after panting, while harvest of day-neutral strawberries is in a planting year) and very high yields. This crop is also very valuable for fresh consumption and processing industry (Milić et al., 2008; Milić, Sredojević, 2010).

The latest research suggests that supplementary diets of strawberries is associated with delays in age-related decline in neural activities and behavioral deficits, ant carcinogenic activities in breast and cervix cells and significant reduction in negative impact of free radicals on gastric mucosa. Strawberry fruit contains large numbers of phenol acids and bioflavonoid compounds with powerful antioxidant properties (Wang, Lin, 2000).

Advances in new variety development, cropping systems and fruit marketing of short-day strawberries extended the traditional harvest season. This also initiated development and implementation of new technologies in strawberry production (Lieten, 2003; Safley et al., 2004; Ballington et al., 2008; Rowley et al., 2010; Milić, Sredojević, 2010).

Moreover, the research in day-neutral strawberry production provides a unique harvest season extension. Current and potential strawberry growers need not only relevant production and marketing information, but also precise financial information to make informed decisions about existing strawberry operation and possible expansion or new technology adoption. In addition, Pritts and Castaldi (1990) suggested that financial analyses are useful for identifying those factors which have the biggest impact on strawberry production in an environment and can help the researchers determine how best to allocate funds within research programs based on importance of variables studied.

Material and methods

The objective of this study is to examine the current technology of strawberry production in North America. The case study is short-day strawberry production under matted-row system in South-western Ontario. This study has two overall objectives. The first is to show that short-day strawberry production is profitable in Ontario. The second is to adapt current intensive short-day strawberry production technology used in Ontario to strawberry growers and researchers in Republic of Serbia and Republic of Serbian.

A survey technique was used to collect data. The survey collected data on materials, labour and machinery and equipment used for all short-day strawberry production procedures performed. Each of these procedures is divided into three groups: 1) replant; 2) establishment; and 3) harvest year procedures. The survey also collected data on yields, price achieved, and sale channels.

The survey technique was a method of choice for data collection since Canada does not have a system of accountancy data collection, such as Farm Accountancy Data Network (FADN) in Europe. It is an instrument for evaluating the income of agricultural holdings and the impacts of the Common Agricultural Policy in Europe (Sredojević, Mojsijev, 2013). The data collection was endorsed and facilitated by the Ontario Berry Grower Association (OBGA) and berry crop specialist of the Ministry of Agriculture

and Food (OMAF) of Ontario. The OBGA suggested potential growers in South-western Ontario to be included in the survey. The establishment cost of strawberry production is based on average cost from 28 growers in South-western Ontario (http://ontarioberries.com/). The average cost was calculated from analytical calculations of surveyed growers during the period 2008-2012. All calculations are expressed per hectare. This calculation model allows calculating fixed and variable expenses for all strawberry production procedures, total income and financial results achieved.

Results and discussion

Like many high-value crops, strawberry production is resource and labour-intensive and carries a high degree of risk. But also, short-day strawberry production leaves ample of additional room for profit increase. Continued interest in the crop depends on the size of returns after costs are covered. To make informed decisions a new grower needs an economic analysis of the cost of strawberry production from existing growers.

Yield Achieved

Strawberry yield is a complex trait, and is determined by an interaction of environment and inherited traits such as number and size of the fruits, plant volume and cold, pest and disease tolerance. These inherited traits define a variety. Therefore, yield is determined by variety and number of plants per area. Yield, is also affected by cultural practices, degree of the investments in production and growers knowledge and understanding of common principles of the strawberry plant.

As a high-value crop strawberries are grown on the best agricultural soils in Ontario. The main strawberry-producing areas are located in proximity to major urban centers and important transport corridors within the Great Lakes modified continental climate. According to results the largest yields are achieved in: Essex, Middlesex, Oxford, Norfolk and Brant counties, on farms located along Highway 401 and farms in the vicinity of the Greater Toronto Area.

Yields can be affected by family tradition of strawberry production, and grower's will to adopt new technologies in strawberry production. It is interesting to note that the average strawberry yields of 10,000 kg/ha or higher were achieved on farms with good working relations with research institutions. The average yield on farms with a tradition in strawberry production was from 7,840 kg/ha to 16,800 kg/ha per season (Table 1).

The lowest yields were recorded on farms with strawberries as a new crop within the production program. The survey data suggest that the main reason for yield reduction is lack of adequate weed, pest and disease management. The pesticide regime of strawberries is intensive and complex, which requires excellent knowledge of strawberry production technology to secure adequate plant protection and safe fruit.

Table 1. The average yield per location[1, 2]

Locations	First harvest year (kg/ha)	Second harvest year (kg/ha)	Total
1[1]	16,800	11,200	28,000
2[1]	13,440	11,760	25,200
3[1]	8,960	5,600	14,560
4[1]	11,200	11,200	22,400
5[2]	2,464	2,016	4,476
6[2]	3,584	3,248	7,102
7[1]	6,160	4,620	10,780
8[1]	8,400	8,400	16,800
9[1]	6,082	3,808	9,890
10[2]	6,720	6,160	12,880
11[1]	6.720	6.720	13.440
12[1]	15,120	15,120	30,240
13[1]	13,440	10,080	23,520
14[1]	8,736	8,400	17,136
15[2]	7,280	6,160	13,440
16[1]	13,440	10,080	23,520
17[2]	6,720	6,160	12,880
18[1]	7,840	7,840	15,680
19[2]	6,272	6,272	12,544
Average	8,915	7,623	15,722

Source: Authors calculation based on survey 28 producers strawberries in South-western Ontario
Note: [1]Average five-year yields from the same location, but different fields from 2007 to 2012; [2] Yields achieved in 2011-2012, first time strawberry growers are included in this group.

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The achieved yields are somewhat lower or within the range reported in literature. In a variety trial in Ontario, reported yields from 2,900 kg/ha to 20,600 kg/ha per season. The reported size of the yields was highly dependent of experimental location. Handley and Dill (2009) examined varietal phonological properties of several varieties grown in eastern part of United States of American.

The authors reported yields from 6,543 kg/ha to 18,391 kg/ha per season, while Stevens et al. (2011), in the same region, recorded yields 13,700 kg/ha. It is important to note that yields reported on farms are about 80% of yields achieved in experimental conditions.

Cost of Production

The cost of short-day strawberry production includes the following elements: equipment, labor, external services, materials, overhead and miscellaneous costs (cooling and transport of berries). Each cost element is further categorized within four cost categories: 1) field establishing cost, 2) cost of planting and care of young plants after planting, 3) cost of care and harvest in first production year and 4) cost of care and harvest in second production year.

The total cost to produce short-day strawberries is 54,370 $CAD/ha (Table 2). The cost of care and harvest in first production year was 20,812 $CAD/ha and the cost of care and harvest in second production year was 19,930 $CAD/ha, which comprised 69.42% of the total. The lowest cost was recorded in the pre-plans year at 8.13%, while the cost of planting and care of young plants after planting accounted for 22.45%.

Table 2. Total cost of short-day strawberry production ($CAD/ha)

Cost	Pre-plans	Planting and care	Harvest and care in 1st year	Harvests and care in 2nd year	Total	Participation (%)
Equipment	611	2,132	1,415	1,174	5,332	9.80
Labor	258	3,360	10,531	8,571	22,720	41.79
Custom services	398	399	277	67	1,141	2.10
Materials	3,154	4,951	4,983	3,815	16,903	31.09
Overhead cost	-	1,364	1,689	1,660	4,713	8.67
Miscellaneous	-	-	1,917	1,645	3,562	6.55
Total	4,421	12,206	20,812	16,931	54,370	100.00
Participation (%)	8.13	22.45	38.28	31.14	100.00	-

Source: Authors calculation based on survey 28 producers strawberries in South-western Ontario

Overall materials and labor costs accounted for almost ¾, while equipment, custom cervices, overhead and miscellaneous costs made up remaining ¼ of the total cost to grow-short day strawberries under matted-row system.

Financial result

Financial result for short-day strawberry production is calculated as the difference between total income in the first and second harvest years and total strawberry production cost. The income for first and second harvest years was calculated as a sum of income for each channel of strawberry sale for both years, while the income for each channel of sale is the product of average price received and its portion in the total yield (Table 3).

Table 3. Total income per channel of sale and total cost ($CAD/kg)

Indicators	U-Pick* (25%)	Wholesale (45%)	Retail** (30%)	Total
1.Total income: both years				76,671
-Income in first year	8,915	15,084	17,331	41,330
-Income in second year	7,623	12,898	14,820	35,341
2. Total cost	/	/	/	54,370
NET INCOME (1-2)				22,300

Source: Authors calculation based on survey 28 producers strawberries in South-western Ontario
Note: * Customers pick strawberries; ** Farm gate and local farmer's market sale.

The direct sale at the farm's gate and local farmer's market accounted for only 30% in total strawberry sale, but it achieved highest income due to high sale prices. The total sale value in both years, from all channels of sale, was 76,671 $CAD/ha. The income in the first and second year was 41,330 and 35,341 $CAD/ha, respectively. The total expense to grow short-day strawberries was 54,371 $CAD/ha (sum of expenses in pre harvest year, planting and care of young plants after the planting and care and harvests in both years), (Table 3). Strawberries are an intensive crop. Sales per hectare are high, but costs are also high. However, it still adds considerably to the total earning power of the whole farm business at 22,300 $CAD/ha. Therefore, average net revenue or profit, which is the earnings for risk and management, amounted 29.10% of the sales value of the crop. This is comparable with that for other fruit crops, even to the earnings by most annual cash crops.

The average profit is comparable to results achieved by other researchers. Garwood (1998) reported that average net return of strawberries grown in matted–row production systems in North Carolina was 14,424 $US/ha. The net return in this study was 30 to 75% higher compared to returns reported by DeMarree (1998) in United States of America, Combe and Fisher (1999) in Ontario. However, achieved net revenue was 64% lower compared to revenues reported by Stevens et al. (2011) in United States of America. It is important to note that their financial analysis did not include overhead, custom services and miscellaneous costs. The cost of material and labour was two to three times lower compared to Ontario conditions.

Conclusion

The establishment and production costs of short-day strawberries grown under matted-rows system were 54,370 $CAD/ha. The average costs of pre plant operations were 4,421 $CAD/

ha. The fixed costs accounted for 9.34%. The materials made up 71.34% of the total pre plant costs. The cost of operations to maintain and protect soil quality and structure comprised 24.49%. Manure application was the highest cost item (11.88%), while soil sampling and analysis the lowest (1.83%). Costs for planting and care of young plants were 12,206 $CAD/ha. Variable costs accounted for 80.49% of the total.

The materials and labor costs comprised 40.53% and 27.53% of the variable cost, respectively. The costs of pre-plans and planting and after planting operations costs made up 30.58%, or 16,627 $CAD/ha of the cost to grow short-day strawberries under matted-row system. The costs of regular care and harvest in first production year were 20,812 $CAD/ha. The variable costs accounted for 80.49% of the total. The labor and material costs comprised 56.83% and 26.89% of the variable cost, respectively. The costs of regular care and harvest in second production year were 16,931 $CAD/ha. The variable costs accounted for 87.83% of the total. The labor and material costs made up 57.70% and 25.68% of the variable cost, respectively.

The total income of short-day strawberries grown in a matted-row system was 76,671 $CAD/ha. The income in the first and second production years were 41,331 $CAD/ha and 35,341 $CAD/ha, respectively. The total production costs were 54,370 $CAD/ha (the sum of pre-plans, planting and care of young plants, care and harvest in the first production year and care and harvest in the second harvest year costs). Strawberries are an intensive crop in terms of labor and resources. The sales per hectare are high, but costs are also high. However, net revenue analysis showed that growers in Ontario at average yield of 15,772 kg/ha achieved profit of 22,300 $CAD/ha, which is 29.10% of the sales value of the crop.

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OSTVARENI FINANSIJSKI REZULTAT U PROIZVODNJI JAGODE KRATKOG DANA

Dragan Galić[4], Dušan Milć[5], Zorica Sredojević[6]

Rezime

U uslovima kontinentalne klime jugo-zapadnog Ontarija u kojima su leta kratka i vruća, a zime hladne, dominantno je gajenje jagode kratkog dana u redovima na otvorenom polju. U strukturi proizvodnje učestvuju rane, srednje i kasne sorte, što omogućava berbu od 5 do 7 nedelja. Ukupna eksploatacija jagodnjaka je dve godine. Troškovi zasnivanja i proizvodnje jagode kratkog dana u prvoj i drugoj godini posle sadnje iznose ukupno 54.370 $CAD/ha. Troškovi nege i berbe u prvoj godini iznose 20.812 $CAD/ha, a troškovi nege i berbe u drugoj godini su 16.930 $CAD/ha, pri čemu učestvuju sa 69,42 % u strukturi ukupnih troškova zasnivanja i redovne proizvodnje jagode. Najniža ulaganja su pri zasnivanju zasada sa učešćem od 8,13%, dok je udeo troškova sadnje i nege zasada u ukupnim ulaganjima 22,45%. Ukupan prihod u proizvodnji jagode kratkog dana je 76.671 $CAD/ha (41.330 $CAD u prvoj godini i 35.341 $CAD/ha u drugoj godini). Prema tome, i pored visokih ulaganja po jedinici površine kod jagoda kratkog dana, uz prosečan prinos od 15.772 kg/ha, ostvaruje se profit od 22.301 $CAD/ha.

Ključne reči: *jagode kratkog dana, troškovi proizvodnje, vrednost proizvodnje, finansijski rezultat.*

4 Mr Dragan Galić, Univerzitet Guelph, Departman biljne poljoprivrede, Box 587, Simcoe, N3Y 4N5, ON, Canada, Telefon: 001 519 428 22 45, E-mail: dgalic@uoguelph.ca

5 Dr Dušan Milić, redovni professor, Univeryitet u Novom Sadu, Poljoprivredni fakultet, Trg Dositeja Obradovića 8, 21000 Novi Sad, Srbija, Telefon: +381 21 485 32 30, E-mail: milic@polj.uns.ac.rs

6 Dr Zorica Sredojević, redovni profesor, Univerzitet u Beogradu, Poljoprivredni fakultet, Institut za agroekonomiju, Nemanjina 6, 11080 Beograd, Srbija, Telefon: +381 11 2615 315, E-mail: zokas@agrif.bg.ac.rs

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DETERMINATION OF ECONOMIC SELECTION INDEX COEFFICIENTS FOR DAIRY COWS[1]

***Sanjin Ivanović*[2], *Dragan Stanojević*[3], *Lana Nastić*[4], *Marko Jeločnik*[5]**

Summary

There is no research regarding economic effects of genetic improvement for dairy cattle in Serbia. Therefore, the goal of this paper is to determine economic values for various production traits (milk yield, milk fat content and proteins content) in dairy production, as well as to determine total economic selection index. The research is based on data which include 9,516 lactations of 4,893 milking cows from 7 farms. Data were collected during the period 2004 – 2012. Authors used sensitivity analysis and partial budgeting approach to determine changes in revenues caused by variations of particular production traits. It was determined that within economic selection index the most important trait is milk yield, while values for other traits are almost negligible. On the other hand, it is expected that importance of certain traits will be changed after Serbian accession to the European Union.

Key words: *economic selection index, dairy cows, production traits, milk quality, revenue.*

JEL: *Q10, Q12*

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2 Ivanović Sanjin, Ph.D., Associate Professor, University of Belgrade, Faculty of Agriculture, Department of Agricultural Economics, Nemanjina Street no. 6, 11080 Zemun, Serbia, Phone: +381 11 26 15 315/ext 426, E-mail: sanjinivanovic@agrif.bg.ac.rs

3 Stanojević Dragan, Assistant, University of Belgrade, Faculty of Agriculture, Department of Zoo Techniques, Nemanjina Street no. 6, 11080 Zemun, Serbia, Phone: +381 11 26 15 315/ext 169, E-mail: stanojevic@agrif.bg.ac.rs

4 Nastić Lana, M.A., Researcher Assistant, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 697 28 52, E-mail: lana_n@iep.bg.ac.rs

5 Jeločnik Marko, M.A., Researcher Assistant, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 697 28 52, E-mail: marko_j@iep.bg.ac.rs

Introduction

Breeding of domestic animals is a complex zoo technical process, as by the goals that have to be achieved, or methods that are applied, as well as by the required organization related to the collection of data necessary for precise assessment of breeding value. This work includes a large number of participants, starting form breeders, basic, regional and central breeding organizations, centres for artificial insemination, professional and scientific organizations and faculties. There are several mutually different goals of domestic animals breeding, where all of them are determined on the basis of long-term plans and programs for development of animal husbandry. Breeding is carried out by selection of parental pairs, after whose mating is obtained generation of descendants, that have to possess more expressed production characteristics of economic importance in compare to the population from which they originated.

Selection of the parental pairs is usually made on the basis of breeding value of the head of cattle. Breeding value represents the value of the genes that will be transferred to the descendants. Assessment of breeding value is a complex process, which includes a large number of impacts. Up today were developed and in use a number of methods for the assessment of the breeding value of domestic animals, such are selection index, BLUP method, BLUP AM method, etc. Advantages of the selection index, as a method for the assessment of breeding value is its relatively simple use, after equation of selection index is determined (Radojković et al., 2010).The selection index was served as a base for the development of contemporary and more reliable methods for the breeding value assessment.

In order to obtain, for production, more economical animals, there is a necessity for carrying out of the selection on number of characteristics. In mentioned selection, having in mind the level of expression of certain characteristics, often are made the compromises. However, in this case, the overall effect of selection is much greater (Vidović, 2008).Within the selection index are combined the production levels of two or more characteristics, obtaining a score based on which is made the selection. Such an obtained score is in maximal correlation with the genetic contribution of certain individual.

At the very beginning of the use of selection indexes in the dairy cattle breeding, accent was on milk and milk fat yield. VanRaden (2002) determined, during his research of selection indexes in use for breeding value assessment of dairy cattle that in six countries (Germany, France, UK, Israel, Australia and New Zealand) in selection indexes are included just milk traits, in three countries (USA, Canada and Italy) around third part of the total value of selection index refers to the characteristics of the dairy cattle type and longevity, while in certain countries, like Denmark, beside mentioned traits are also introduced a reproductive traits, as well as characteristics related to animal health status. Miglior et al. (2005) stated that the most selection indices were based on improving milk yield and outside North America toward increasing fat and protein content. According to authors in recent years there has been growing interest in functional traits such as reproduction and health. According to Berry et al. (2005) „it is important to bear in mind that some annual traits may be economically relevant in dairy enterprises but not in beef enterprises". Therefore

authors analyse economic values for number of traits related not only to dairy but also to beef production in Ireland. Approach in which are analysed more traits is important, as unilaterally conducted selection in milk traits lead to the negative effects in udder health (Heringstad et al., 2003) and in animal reproductive performances (Veerkamp et al., 2001; Kadarmideen et al., 2003).

Determination of the economic value of certain traits is the most important and the most complex task during the selection index establishment. According to McArthur (1987), economic value of some trait represents a net amount of cash that is obtained in optimal breeding conditions, when certain trait is improved for one unit.

Main goal of this paper is determination of economic selection index coefficients, which will enable calculation of breeding value of black-white cows in Serbia, as well as their later ranking during the parental pair's selection.

Methodology and data sources

Initial set of data for calculation of needed parameters, necessary for the establishment of selection index, comprised of 11,235 lactation performed by 5,633 milking cows. They were the descendants of the 83 bulls –sires. From the set of data were excluded all lactation that had incomplete production data. For more precise assessment of the additive genetic component, all bulls with less than 10 daughters were excluded. After that, all lactations which had values for the observed traits above or below three standard deviations were also excluded. After the base data adjustment process, it was defined the final data set, which included 9,516 lactations realized by 4,893 milking cows from 7 farms of PKB corporation within the period 2004 – 2012. Animals were descendants of 59 bulls and all heads were under the A control of a milk yield.

Establishment of the selection index, having in focus milk production, includes traits of primary importance, such are: milk yield (**MY**), yield of milk fat (fat content **- FC**) and yield of proteins (protein content **- PC**).Production results for the observed traits are adjusted to a standard lactation, and like that are used in the process of selection index establishment.

Breeding value, estimated by the use of selection index method, can be presented with the following general equation for the selection index:

$$I = b_1 (X_1 - \overline{X}_1) + b_2 (X_2 - \overline{X}_2) + \ldots\ldots + b_n (X_n - \overline{X}_n)$$

Where:

I – relative breeding value evaluated by selection index, or value of selection index determined for certain head of cattle;

b_i – multiple regression coefficients for each trait included in the selection index;

$(X_i - \overline{X}_i)$ – difference between phenotypic value of trait included in selection index for certain individual and population average for certain trait.

Starting from the assumption that the correlation between genetic value of individual (G) and selection index value is maximal, it can be come to following equation:

$P*b=G*v$ or $b=G*v*P^{-1}$

Where:

P - Phenotypic variance-covariance matrix;

b - Multiple regression coefficients for each trait included in the selection index

G - Genetic variance-covariance matrix;

v - Vector of relative economic values of the traits included into selection index.

As a matrix, mentioned equation has next form:

$$\begin{bmatrix} \mathrm{VarPH(X1)} & \mathrm{CovPH(X1X2)} & \mathrm{CovPH(X1X3)} \\ \mathrm{CovPH(X1X2)} & \mathrm{VarPH(X2)} & \mathrm{CovPH(X2X3)} \\ \mathrm{CovPH(X1X3)} & \mathrm{CovPH(X2X3)} & \mathrm{VarPH(X3)} \end{bmatrix} * \begin{bmatrix} b1 \\ b2 \\ b3 \end{bmatrix} =$$

$$= \begin{bmatrix} \mathrm{VarG(X1)} & \mathrm{CovG(X1X2)} & \mathrm{CovG(X1X3)} \\ \mathrm{CovG(X1X2)} & \mathrm{VarG(X2)} & \mathrm{CovG(X2X3)} \\ \mathrm{CovG(X1X3)} & \mathrm{CovG(X2X3)} & \mathrm{VarG(X3)} \end{bmatrix} * \begin{bmatrix} v1 \\ v2 \\ v3 \end{bmatrix}$$

In paper will be presented some of approaches used worldwide in order to calculate the indicator *v*. This is vector of relative economic values of traits included into selection index.

Coefficients of heredity and genetic and phenotypic correlations, in other words values of genetic and phenotypic variances and covariance, were calculated by the method of least squares (Harvey, 1990) and by the application of next mixed model:

$$Y_{ijklm} = \mu + O_i + F_j + L_k + G_l + S_m + b\,(X - \bar{\mathbf{X}}) + e_{ijklm}$$

Where:

Y_{ijklm} - manifestation of tested trait;

μ - average of population;

O_i - random effect of i^{th} bull-sire;

F_j - fixed effect of j^{th} farm;

L_k - fixed effect of l^{th} lactation;

S_m - fixed effect of k^{th} season of calving;

$b\,(X - \bar{\mathbf{X}})$ - regression effect of part of HF breed genes;

e_{ijklm} - random effect of non-determined factors.

Very detailed review of methods which could be used to derive economic values for various traits in dairy cattle breeding is presented by Groen et al. (1997). There are described objective (modelling - system analysis) versus non-objective methods (desired or restricted gain indices). Authors describe two approaches to modelling. The first is positive approach (data evaluation) which assumes use of historical data. The second is normative (data simulation) approach which uses profit functions and bio-economic models. While describing determination of economic value for dairy cattle Seyedsharifi et al. (2013) stated that risk can be incorporated in this process. Authors describe methods for deriving economic weights, which can be divided into positive (data analysis) and normative (bio-economic modelling) methods. MacNeil et al. (1997) gave an overview of various methodologies that can be used for determination of relative economic values for beef production on farm level. Authors discussed use of profit equations (for male calves, surplus heifer calves and cull cows), sensitivity analysis (on the basis of partial derivative of profit with respect to the parameter), shifts in cost function (marginal costs and marginal revenues are used to determine profit maximizing level of output).

Example of sensitivity analysis use is presented by Miesenberger et al. (1998) for Simmental population in Austria. The analysis started from the herd model dealing with milk production, bull fattening and heifer rearing. There was an assumption of a quota for the sum of fat and protein yields. As entire herd was observed, economic value of a trait is computed on the basis of profit on farm per year before and after a genetic change. Toivakka et al. (2005) also used level of herd and sensitivity analysis to determine economic value of various biological and functional traits in Finnish dairy cattle production. Similar approach for construction of economic selection index is used by Khan and Mazumder (2011) for individual dairy cows of different dairy breed groups on different farms in Bangladesh. There were observed three traits (lactation milk yield, calving interval and live weight). There was used linear profitability model on which was applied sensitivity analysis (the economic value of individual traits was obtained by re-running the base model after changing one unit of each trait while maintaining the other traits at a constant level).

Steine et al. (2008) applied profit function to estimate the economic values of the traits included in the breeding goal for Norwegian Red dairy cattle. Authors observed 10 traits using data from more than 3,000 Norwegian dairy farms over period of five years. The data set consisted of farm-level data as well as estimated breeding values for each cow's sire. Results indicated that selection has led to shift in profits of the farms. Profit function was also used by Komlósi et al. (2010) to estimate economic values of 15 traits for Hungarian Holstein - Friesian cattle. Authors also determined relative economic importance of each trait or trait component. Hietala et al. (2014) used "calculation of revenues and costs for each animal group and the total profit of production based on a function of biological, economic and management parameters" to determine economic value of traits in Finnish dairy production. In this paper authors used discounted revenues and costs, which means that time value of money was taken into account. On the other hand, Roibas and Alvarez (2010) used production function (production frontier approach) rather than profit function. Production function enabled authors to calculate the increase in milk production and farm

profit associated with a change in genetic level. For the analysis authors used gross margins calculated for various scenarios.

To determine economic selection index for dairy caws, all partial economic weights (selection index coefficients) for all observed traits have to be calculated, which is the goal of this paper. Selection index coefficient is economic value of genetically improved certain trait. At the same time all other traits are unchanged.

Results with discussion

In Table 1 are presented average values and variability of dairy traits in standard lactation that were achieved by observed heads of cattle. Presented data of milk yields are used as a base for determination of partial economic weights for observed traits.

Table 1. Indicators of phenotypic manifestation and variability of milk yield traits in standard lactation

Traits	n	$\bar{X}$	SD	min	max
MY (kg)	9,516	8,261	1,650	3,373	13,597
%FC (%)		3.57	0.192	2.92	4.25
Yield of milk fat (kg)		294.14	59.16	120.43	481.58
%PC (%)		3.27	0.109	2.89	3.65
Yield of milk proteins (kg)		270.07	52.71	111.50	439.20

Source: Calculation according Authors' research.
Notes: MY- milk yield; %FC - milk fat content; %PC – milk proteins content.

Observed herd of animals, in standard lactation, in average, produced 8,261 kg of milk with 294.14 kg of milk fat and 270.07 kg of protein. Determined values are significantly higher than the values recorded in researches on same population by Đedović (2000), Beskorovajni (2000) and Carlen et al. (2004). After comparison of determined values for observed traits with the results recorded by Beskorovajni (2014), milk yield and milk fat in standard lactation have higher values, while the value for the content of milk fat is in line with gained results of mentioned author.

Within the study was examined the impact of fixed factors on phenotypic expression and variability of milk production traits in standard lactation, like are farms, lactations, years and seasons in which the observed heads of cattle were in production. In Table 2 are given the values of F-test for the examined factors.

Table 2. F-test values for the researched factors

Trait	F value				
	Farm	Lactation	Year	Calving season	Model determination (r^2)
Milk yield (kg)	14.96**	211.10**	15.74**	50.14**	0.223
Content of milk fat (%)	66.85**	6.66**	24.65**	6.33**	0.056
Yield of milk fat (kg)	32.68**	187.34**	21.98**	43.11**	0.208
Content of proteins (%)	72.84**	6.19**	30.42**	25.75**	0.048
Yield of proteins (kg)	18.34**	211.63**	17.36**	40.93**	0.224

Source: Calculation according Authors' research.
Notes: **statistically there is a highly significant difference ($p<0.01$).

Analysed factors had statistically highly significant ($p <0.01$) impact on all observed traits in the standard lactation. To similar results, in their researches, had also came Latinović et al. (1990), Stanojević et al. (2012) and Beskorovajni (2014).

Having in mind the heritability of observed milk traits in standard lactation, in available literature sources can be encountered values that have a wide interval of variation. Coefficients were calculated by method of interclass correlation per sire by use of mixed model. Determined values for the heredity coefficients, as well as their errors are presented in Table 3.

Table 3. Values of the coefficient (h^2) - heredity of milk traits in standard lactation and their errors (S_h^2)

Trait	h^2	S_h^2
Milk yield (kg)	0.199	0.037
Content of milk fat (%)	0.078	0.018
Yield of milk fat (kg)	0.185	0.035
Content of proteins (%)	0.042	0.012
Yield of proteins (kg)	0.20	0.037

Source: Calculation according Authors' research.

Values of the heredity coefficients ranged from 0.042 (having in focus the content of protein in milk), to 0.20 for the protein yield. Determined values of the heredity coefficients are significantly lower compared to those recorded by Trifunović (1992), Carlen et al. (2004) and Hung et al. (2008), but much higher compared to the results recorded by Stanojević et al. (2012) and Đedović et al. (2013).To similar values came Stanojevic et al. (2013) and Beskorovajni (2014).Obtained values for the heredity coefficients of dairy traits indicate the possibility of their improvement through selection, although the dominant impact on their expression has the environment factors.

For calculation of economic selection index in paper will be used three indicators– quantity of produced milk, content (%) of milk fat and content (%) of proteins. Use of mentioned elements for the development of the economic selection index is primarily caused by data availability. Despite all limitations, on that way determined economic selection index possesses required key elements that are in use worldwide. In this paper the economic value of a trait will

represent the change in revenue from milk, as a result of its unit change. Therefore, the goal of this selection approach will be revenue maximization. On the other hand, profit maximization is not a goal of this paper because of following reasons:

- To calculate profit it is needed to deduct production costs from revenues. Therefore, milk production costs should be determined and separated from total costs of cattle production, which is rather complicated procedure;
- Milk production costs differ for various dairy farms. Costs depend on production technology and equipment, not only in milk production, but also in fodder production;
- Therefore, economic selection index based on changes in revenues has wider application and it can be used on farms of various size, which possess different facilities, equipment and production technology, etc.;
- Such approach enables use of economic selection index at different levels (from animal level, individual farm level, to larger number of farms or entire population).

In paper will be shown, what kind of economic effects will be reached by partial economic weight (economic value of the trait), if milk production per cow increases for 1 kg of milk, as well as if content of milk fat increases for 1%, or if content of proteins grows for 1%. For the economic effects of the milk production growth will be used the price for one litter of milk. However, here occurs the problem that the milk price depends on the content of milk fat and proteins, or in other words, all three indicators are mutually correlated. So, it is necessary to separate the economic effects of increase of mentioned indicators.

This problem was solved in following way – for milk price was taken the price obtained for the milk with basic content of milk fat and protein (i.e. price obtained for the milk before manifestation of the selection effects). On the other hand, partial economic weight for milk fat and proteins is the increase in milk price caused by the growth of the milk fat percentage (i.e. growth of proteins percentage) for one unit. It should be kept in mind that during the calculations, from the market price of milk are excluded subsidies provided by the government, as they do not depend on the content of fat and proteins in milk.

In milk price calculation it was started from the price, paid by the largest dairy plant in Serbia, which purchases around 50% of total quantity of the raw milk delivered from farms in Serbia. Method for determination of the maximal price for the milk of extra class is shown in Table 4. It can be noticed that in entire maximal milk price, increase of protein and milk fat content (compared to standards) has very low contribution in the growth of milk price.

Table 4. Factors that affect the price of extra class milk

Factors	Value (RSD/l)
Initial price for the extra class milk	**28.50**
Incentives for the extra class	5.50
Bonus for the extra class	0.80
Bonus for the registered farms	1.00

Factors	Value (RSD/l)
Bonus for the delivered quantity	3.50
Price of standard quality milk (according to dairy plant standards)	**39.30**
Price growth because of increase of percent of proteins regarding to dairy plant standard	0.30
Price growth because of increase of percent of milk fat regarding to dairy plant standard	0.40
Maximal price for the extra class milk	**40.00**

Source: Standards used by the dairy plant and authors' calculation

In further analysis all incentives and disincentives that can be obtained according to quality class of milk were excluded from the calculation of the milk price. Also, bonuses that dairy plants pay to the registered farms, price corrections related to the content of dry matter in milk, or inadequate temperature of milk, etc., will not be taken into account. From the price of milk should be also excluded bonuses that some dairy plants are giving to producers according to the total quantity of the raw milk delivered from the farm.

All mentioned corrections in milk price calculation allow the application of this methodology without any additional corrections (since the calculation is based on common baselines), as on cattle from large farms, as well as on animals from small family farms. Requirement is that on farms is produced extra or first class milk. It is especially important for family farms which increasingly invest in order to enlarge number of cows. It has been proved that such investments are economically efficient (Gogić et al., 2012).

On the other hand, imperfection of this method is that it will minimize, in some extent, the significance of partial economic weight of cow's milk yield and increase the significance of partial economic weights for the growth of milk fat and proteins in milk, what peculiarly refers to the large farms.

Generally, presented procedure is in line with the sensitive analysis approach that is suggested by number of authors focused on aforementioned problem. So, it is monitored for how much income in milk production will be changed by changing one parameter, while other parameters stay fixed. If all three observed indicators are considered together (growth of produced milk quantity, growth of milk fat and proteins content), total economic selection index will express annual growth of revenues from produced milk (per head of cattle, on one farm, on group of farms, in certain wider population), caused by the improvement of observed genetic traits.

Described approach is partly based on partial budgeting method, which is described in detail by many authors, such as Gogić (2014), Kay et al. (2004) and Andrić (1998). By this approach are not considered all incomes and costs of certain production, but only their change caused by the change that occurs in production (in this case improvement of genetic traits of cows). Method tracks just the changes in incomes of final products, in this case that are the incomes from the milk sale. Partial budgeting method does not follow the change of fixed production costs and overhead costs, as they have no impact on the change in profit. Reason for that can be find in fact that there is no additional investment in facilities, equipment, or land. So effects of selection are occurred in unchanged production conditions. In line to previously mentioned, unlike the usual use of the partial budgeting method, here will be not tracked the

changes in costs caused by selection (e.g. changes in food costs that grow due to growth of milk yield per one cow).

Based on previous considerations, calculation of partial economic weights was performed, after determination of milk price gained for the milk of observed cow's population. This was done by correction of basic milk price given by dairy plant, based on variation in milk fat and proteins content in compare to observed cows. Content of milk fat and proteins differs from dairy plant standards (Table 5).

Table 5. Content of milk fat and content of proteins in milk

Indicator	Dairy plant standard	Average for the cattle covered with research	Deviation from dairy plant standard
Content of milk fat (%)	3.80	3.57	-0.23
Content of proteins (%)	3.20	3.27	+0.07

Source: Calculation according Authors' research

Initial price of milk of extra and first class quality reduced for mentioned incentives amounts at 28.50 RSD/l, but after its correction for the deviations from dairy plant standards (regarding content of milk fat and proteins), it will be obtained the milk price for all observed cattle in amount of 28.38 RSD/l.

After focusing on method used by dairy plant for the payment of increased percent of milk fat and proteins, following partial economic weights (selection index coefficients) are determined (Table 6).

Table 6. Partial selection index coefficients

Indicator	Partial economic weights
Growth of milk yield (RSD/l)	28.38
Growth of milk fat content for 1% (RSD/l)	1.00
Growth of milk proteins content for 1% (RSD/l)	1.50

Source: Calculation according Authors' research

Bearing in mind that selection is expected to provide increase in milk yield, as well as in milk fat and proteins content, total economic selection index will be calculated by following formula:

ESI = (MYI x 28.38) + (MYI x GFC x 1.00) + (MYI x GPC x 1.50)

Where:

MYI – milk yield increase,

GFC – growth of milk fat content,

GPC – growth of proteins content.

For example, breeding goal for the Holstein - Friesian cattle in Serbia is achieving of average milk production in standard lactation of minimum 9,000 kg of milk with 4.00% of milk fat and 3.50% of proteins (Institute for animal husbandry, 2010).

After the change of planned production volume from kilograms to litters, it will be gained the ESI value of 20,929.70. On that way, it can be also determined ESI for individual head of cattle or single farms, and these ESI can be mutually compared in order to make appropriate conclusions about the selection effects.

Conclusion

In paper are presented different ways for determination of economic selection index (partial selection index coefficients, as their elements) which are in use worldwide. Also, it was explained the way for mentioned indicators calculation that is possible according to data available in Serbia. Obtained results point out the fact that dairy plants in Serbia usually pay for milk quantity, while its quality does not play significant role within the process of repurchase price determination. Even a large increase in milk fat and proteins content will lead to just negligible increase of milk price. Such an orientation of dairy plants leads to disvalue of activities undertaken by selection service in milk quality improvement.

It can be expected that the dairy plants will change used method in repurchase milk price determination after Serbia access the EU and get some limitations in terms of allowable volume of produced milk. In that case much more attention will be paid to the milk quality (content of milk fat and proteins) than the produced quantity. At that moment previous work of breeders, on improvement of mentioned parameters, will be considered as economically justified.

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UTVRĐIVANJE KOEFICIJENATA EKONOMSKOG SELEKCIJSKOG INDEKSA ZA MLEČNE KRAVE

Sanjin Ivanović[6], Dragan Stanojević[7], Lana Nastić[8], Marko Jeločnik[9]

Sažetak

U Republici Srbiji do sada ne postoje istraživanja koja se odnose na ekonomske efekte genetskog unapređenja mlečnih krava. Zbog toga je cilj ovog rada utvrđivanje ekonomske vrednosti za različite proizvodne osobine (prinos mleka u standardnoj laktaciji, sadržaj mlečne masti i sadržaj proteina) u proizvodnji mleka, kao i da utvrdi ukupni ekonomski selekcijski indeks. Istraživanje je bazirano na podacima koji obuhvataju 9.516 laktacija 4.893 muznih krava sa 7 farmi. Podaci su prikupljeni tokom perioda 2004 – 2012. godina. Autori su koristili senzitivnu analizu, kao i metod diferencijalne kalkulacije da bi utvrdili promene u prihodima uzrokovane variranjem pojedinačnih proizvodnih osobina. Utvrđeno je da je u okviru ekonomskog selekcijskog indeksa najvažnija osobina prinos mleka u standardnoj laktaciji, dok su vrednosti ostalih proizvodnih osobina gotovo zanemarljive. Sa druge strane, očekuje se da će se značaj *pojedinih proizvodnih osobina promeniti nakon pristupanja Srbije Evropskoj Uniji.*

Ključne reči: *ekonomski selekcijski indeks, mlečne krave, proizvodne osobine, kvalitet mleka, prihod.*

6 Prof. dr Ivanović Sanjin, vanredni profesor, Univerzitet u Beogradu, Poljoprivredni fakultet, Institut za agroekonomiju, Nemanjina 6, 11080 Zemun, Srbija, Telefon: +381 11 26 15 315/ lok 426, E-mail: sanjinivanovic@agrif.bg.ac.rs

7 Stanojević Dragan, asistent, Univerzitet u Beogradu, Poljoprivredni fakultet, Institut za zootehniku, Nemanjina 6, 11080 Zemun, Srbija, Telefon: +381 11 26 15 315/lok 169, E-mail: stanojevic@agrif.bg.ac.rs

8 Nastić Lana, M.A., istraživač saradnik, IEP, Volgina 15, 11060 Beograd, Srbija, Telefon: +381 11 697 28 52, E-mail: lana_n@iep.bg.ac.rs

9 Jeločnik Marko, M.A., istraživač saradnik, IEP, Volgina 15, 11060 Beograd, Srbija, Telefon: +381 11 697 28 52, E-mail: marko_j@iep.bg.ac.rs

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FOOD SECURITY AND REGIONAL AGRICULTURAL MARKET: ECONOMIC ANALYSIS AND DEVELOPMENT PROSPECTS

Marina Lescheva[1], Anna Ivolga[2]

Summary

The analysis of dynamics and current state of an agrifood market is conducted on the case of the agrarian region of Stavropol Krai. The research objective is to analyse development factors and tendencies of the regional agrifood market; to assess the import dependency rate of selected product sectors; to investigate the perspective directions of domestic market saturation. The research subject is a system of economic relations, directed on the establishment and development of the agricultural commodities and food market, and a range of special economic measures for insurance of the food security in the Russian Federation. The analysis includes the market capacity and level of self-sufficiency in the Stavropol Krai, which are defined by basic foodstuffs. It is found that people's needs in food are covered insufficiently. It is revealed that Stavropol Krai is an active player on both inter-regional and international markets, with the substantial amounts of counter deliveries. Agricultural raw commodities of low added value predominate in export, while processed ones of higher added value – in imports. Food processing industry of the region is underdeveloped, however, it has substantial reserves for development. The major protection measures of domestic food market are defined in the paper: diversification of agricultural production, and industrial and logistics infrastructure development of the regional agrarian market. The results can be used by regional government authorities in improving of the domestic food market regulations.

Key words: *food security, agriculture, regional market, import, export, consumption, income of the population.*

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1 Marina Lescheva, Ph.D., Professor of the Department of Economic Analysis and Audit, Stavropol State Agrarian University, 12, Zootekhnichesky Pereulok, 355017 Stavropol, Russia, Phone: +7 86 52 35 59 80, E-mail: marina_lesheva60@mail.ru

2 Anna Ivolga, Ph.D., Associate Professor of the Department of Tourism and Service, Stavropol State Agrarian University, 12, Zootekhnichesky Pereulok, 355017 Stavropol, Russia, Phone: +7 86 52 35 59 80, E-mail: annya_iv@mail.ru

Introduction

Providing the population with food in sufficient quantity and variety is a challenge, which includes a range of issues of food production, import dependence and export orientation of the food market, solvency and dietary patterns of the population.

Domestic production of basic agricultural commodities and food in many countries, including such big agricultural producers as Russia, fails to meet demand. Such countries have to rely on agricultural imports, leaving them vulnerable to global price fluctuations and impacting their export revenues, which tremendously threat food security of those nations (Serova, 2014).

Obviously, in the international realm, countries are different from each other that are why issues of food security have to be defined through the prism of national interest (Wegren, 2013). Despite the considerable amount of work carried out the issues of availability of food need to be updated, require adaptation to develop regional strategies for agricultural development to the specific conditions of the modern domestic food market, which determined the purpose and objectives of the present study (Giovannucci et al., 2012). In the domestic realm, the evidence about food security is mixed; the content of this issue is different to the one on the international level (Wegren, 2013).

The need to conduct it was enhanced due to the publication of the Decree of the President of the Russian Federation V. V. Putin "On the application of certain special economic measures to ensure the security of the Russian Federation" from 06.08.2014 (Decree №560, 2014), the Decree provides for restrictions on the importation into Russia of certain types of food from the United States, Canada, the EU, Australia and Norway for a period of one year. The rating of Russian regions depending on imported food and preparedness for renunciation becomes therefore of particular relevance.

This defines the purpose of the study – to analyse the factors shaping and state food market one of the largest Russian regions, to assess the degree of its dependence on imports of certain products and to identify the most promising areas of complete saturation.

Material and Methods

Investigations were carried out on the basis of dialectical, abstract-logical, comparative methods using the factor and correlation analysis of official statistical information, research data of scientific publications.

For the purposes of the current research, we have primarily addressed the works by Russian and foreign researches and experts. Demand management, agro-food products are considered in the works by Gajsin R. S. Factors affecting food security in the region, are described in the works by Siptic S. O., Romanenko I. A., Afanasiev E. V., Grigoriev N. V., Rudov E. V. There are a large number of publications on the organization of marketing research. The most significant of these include the publications by T. S. Bronnikov, E. P. Golubkova, F. I. Evdokimova, V. N. Eremina, E. M. Feoktistova and V. P. Hlustova.

Special attention was paid to the investigations of the contemporary issues of food security in Russia, made by Wegren (2013), Serova (2014), Ivolga and Timofeeva (2014) and Savkin and Pervykh (2013). Effects of agricultural production on food security and vice versa are obtained from Jelocnik and Ivolga (2012), Kiselev et al. (2013) and Stringer (2000) and Ivolga (chapter "State Program for Development of Agriculture and its Contemporary Applications: Issues of Rural Development in Russia" in Erokhin et al, 2014, pp. 69-83). Since food security is directly related to international trade in agricultural commodities and food, we have also addressed works of Josling et al. (2010) and Hailu (2010) in the sphere of trade in agricultural products between developed and developing countries; Erokhin et al. (2014) in the sphere of trade in agricultural products between developed and developing countries; Erokhin in the sphere of effects of trade liberalization and state support of agriculture for developing countries (chapter "Ensurance of Sustainable Rural Development through Liberalization of Trade with Agricultural Commodities and CAP Reforms" in Erokhin et al., 2014, pp. 49-68); Erokhin and Ivolga (2012) in the aspects of sustainable rural development through trade integration.

Data for the purposes of the current research had been obtained from the reports of the Territorial Body of the Russian Federal Service of State Statistics in Stavropol Krai (2013). The following state programs have been considered: State Program for Development of Agriculture and Markets of Agricultural Commodities, Raw Materials and Food for 2013-2020 (2012), and Doctrine of Food Security of the Russian Federation (2010).

Results and Discussion

The analysis was conducted on the case of Stavropol Krai. Agrarian sector is one of the leading ones in the regional economy. Agricultural production provides 10-15% of the gross regional product (GRP), accumulates 13-16% of the total investment, and employs 17.3% of the domestic population.

The region has considerable land resources (the 8th place in the Russian Federation), it is characterized by high natural fertility of soils (47% of all land is black soil). More than 2 hectares of agricultural land and 1.4 hectares of arable land account per inhabitant of the Stavropol territory, which is higher than the Russian average and reflects one of the highest rates of land provision regions – agricultural producers. In conjunction with the availability of labour resources, rich historical experience and traditions of agricultural production and favourable bioclimatic conditions are characterized by considerable economic potential for the solution of not only regional but also the general federal objectives of improving food security and the provision of food.

Over the last decade, the importance of the region in the country's food security for most products is increasing (Table 1). Currently, the territory is a major producer of grain (9% of Russia's gross harvest), sunflower (5%), sugar beet (4.8%) and wool (the 2nd place in the country).

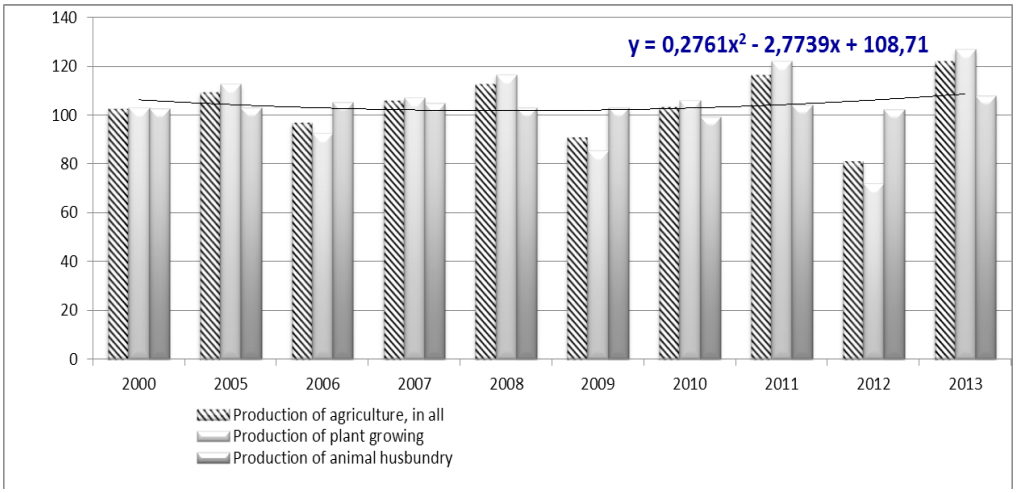
Table 1. Share of the Stavropol Krai in agricultural production of Russia (in %)

Indicators	On average for	
	2000 - 2005	2008 - 2012
Agricultural products	2.7	3.0
including:	7.1	8.7
- grain	3.0	4.8
- sugar beet	5.9	5.1
- sunflower	1.8	2.0
- milk	2.7	2.8
- meat in carcass weight	2.1	2.2
- eggs	13.9	13.0

Source: authors' development based on (Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013)

After the recession of 1990s, agricultural production in the region has been growing. In the long-term retrospective output indices of agricultural products around the territory is above the Russia's average, but the sensitivity of the industry to changes in weather patterns in the Stavropol Krai is much higher. In the extremely dry 2010-2012, the gross crop production declined on 10% and 19% correspondingly. In this regard, the trend line reflects the low rates of positive development (Figure 1).

Figure 1. Output indices of agricultural production (farms of all categories of the Stavropol Krai, in comparable prices, % of previous year)



Source: authors' development

In order to identify patterns of modern development of the regional agrocultural and food market, the following major groups of agricultural productswere targeted: corn and its by-products; meat and meat products; milk and dairy products; potatoes; vegetables and food melons; fruits and berries; eggs and egg products; fish and fish products.

The market capacity of listed products was determined by the production method according to the formula:

$$C = P + V_{import} - V_{export} + V_d \quad (1)$$

Where,

P – volume of production during the period,

V_{import} and V_{export} – values ofthe output in imports and exports correspondingly.

V_d – amount of change in the volume of stocks at the beginning and end of the period.

The results of calculation are presented in the Table 2 suggesting that the increase in the Stavropol market capacity was observedfor all products, exept sugar.

Table 2. Capacity of the regional market in the context of product groups (in 000 tons)

Product group	2008	2009	2010	2011	2012	2012 in % to 2008
Products of grain processing (flour, cereals)	394.3	402.4	405.6	409.0	415.2	105.3
Meat and meat products	166.7	175.7	186.1	191.6	207.9	124.7
Milk and dairy products	569.4	578.6	612.2	611.8	614.8	108.0
Potatoes	399.0	413.0	413.7	426.2	441.7	110.7
Vegetables and melons food	458.6	462.2	477.1	482.0	527.0	114.9
Fruits and berries	138.0	136.2	150.1	149.2	142.4	103.2
Sugar	148.4	136.2	152.7	153.5	140.4	94.6
Vegetable oil	48.6	51.3	52.5	57.4	58.8	121.0
Eggs and egg products mln. pieces	818.3	832.3	850.5	984.6	968.6	118.4
Fish and fish products	18.7	20.0	21.7	22.3	25.1	134.2

Source: authors' development based on (Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013)

The most rapid market growth is characterized by meat and meat products (increase on 24.7%), vegetable oil (21%), fish and fish products (34.2%).

The relatively low world food prices, urbanization and rising incomes had contributed to the expansion of demand for these products, thereby stimulating the development of production and trade. The main source of the saturation of the regional food market is its own production. The dynamics of the main types of foodstuffs in the Stavropol region is presented in Table 3. It reflects the essential increase in output of almost commodity groups.

Table 3. Production of basic food in the Stavropol Krai (in 000 tons)

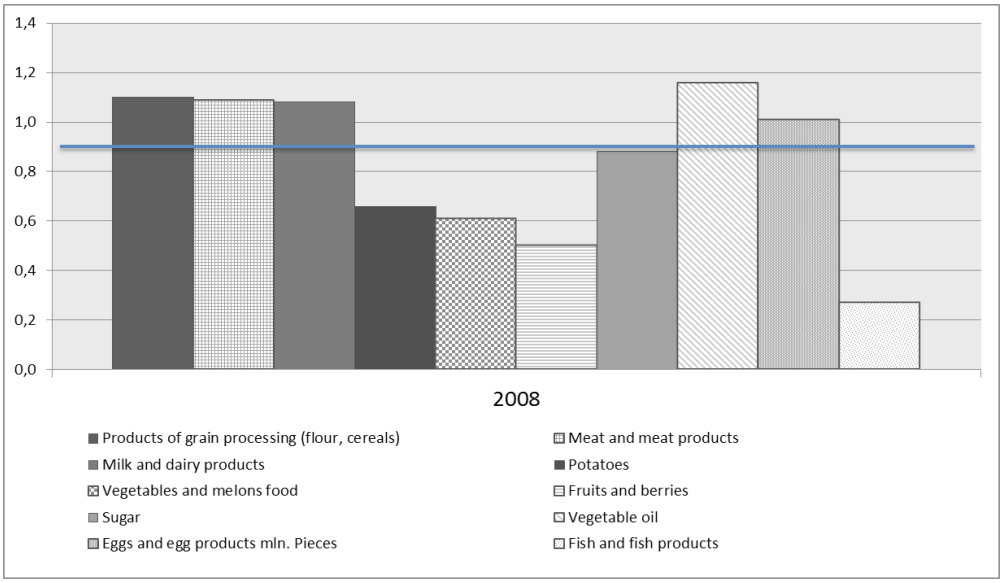
Product group	2008	2009	2010	2011	2012	2012 in % to 2008
Products of grain processing (flour, cereals)	433.3	476.5	471.2	568.1	511.5	118.0
Meat and meat products	178.9	190.1	189.0	207.9	225.2	125.9
Milk and dairy products	611.2	624.0	633.7	664.7	665.3	108.9
Potatoes	261.2	250.7	286.8	345.9	374.2	143.3
Vegetables and melons food	275.1	270.8	335.1	399.5	517.5	188.1
Fruits and berries	68.1	66.9	73.4	71.7	64.9	95.3
Sugar	129.5	106.7	163.1	167.5	55.8	43.1
Vegetable oil	56.2	72.0	44.6	55.4	69.9	124.4
Eggs and egg million. pieces	817.0	823.6	885.9	884.4	817.2	100.0
Fish and fish products	5.0	5.2	5.8	5.8	6.7	134.0

Source: Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013

During the past five-year period the production of vegetables has increased by 88%, 43% – potatoes, 25% – meat and meat products, 24% – of vegetable oil. However, the production capacity of agriculture implemented the region is not fully utilized.

The pre-reform line of 1990 for some individual products has not reached yet. So, in 2013, the beef production was only 25%, pork - by 34%, milk by 36%, eggs - by 72% below 1990 levels. The resource generation of meat, milk, eggs, vegetables and fruits is realizing mainly due to private farms at present. The absence of large-scale production capacity constrains the rate of gross yield of agricultural raw materials and food market saturation. The dynamics of the level of self-sufficiency of the Stavropol Krai food is presented in Figure 2. It was calculated as the ratio of the own output to consumption.

Figure 2. Level of self-sufficiency of basic foodstuffs in Stavropol Krai



Source: authors' development based on (Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2012)

The data show that Stavropol region can provide the domestic consumption of refined products of grain, meat, milk, and vegetable oil. The index of self-sufficiency for these types of products is above1. Local production does not cover domestic needs in such products as potatoes, vegetables, eggs, fruits and berries, fish, and sugar.

Table 4. Dynamics of imports and exports of agricultural products and foodstuffs in the Stavropol territory

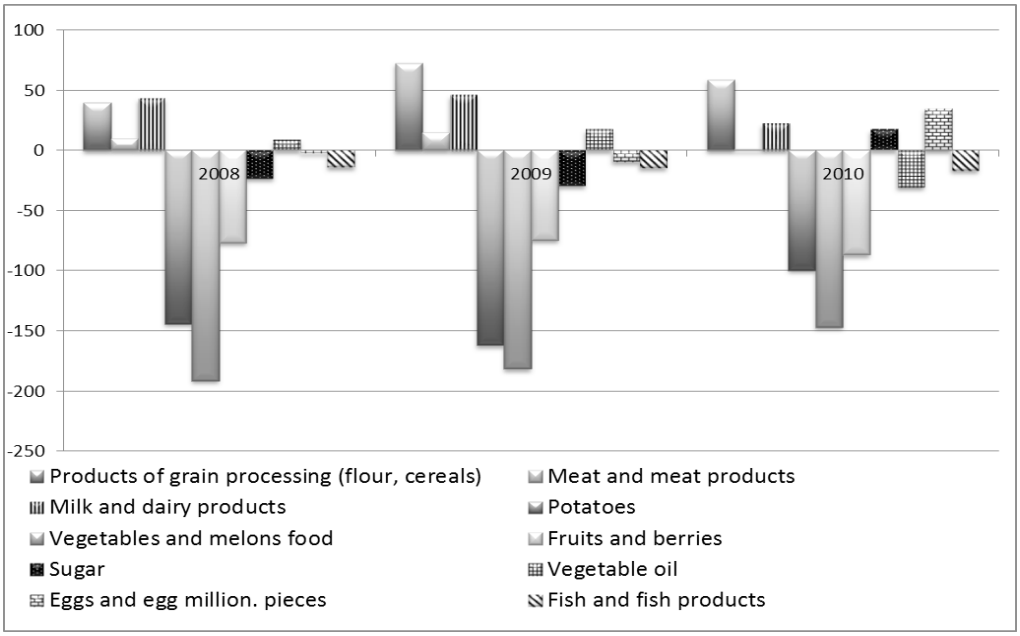
Product group	UM	2008	2009	2010	2011	2012
Products of grain processing (flour, cereals): import	thous. tons	242.6	250.9	162.9	449.9	55.0
Products of grain processing (flour, cereals): export	thous. tons	282.6	323.7	221.6	604.9	160.3
Meat: import	thous. tons	39.0	31.1	40.1	40.0	120.7
Meat: export	thous. tons	48.7	46.3	41.4	56.8	138.9
Milk and dairy products: import	thous. tons	20.2	33.7	41.4	30.5	30.1
Milk and dairy products: export	thous. tons	63.7	79.7	63.8	83.2	77.9
Potatoes: import	thous. tons	143.8	161.7	99.3	111.3	89.0
Potatoes: export	thous. tons	0.0	0.0	0.0	3.1	7.7

Product group	UM	2008	2009	2010	2011	2012
Vegetables and melons food: import	thous. tons	199.5	210.3	162.1	199.2	119.4
Vegetables and melons food: export	thous. tons	8.2	28.9	15.4	95.9	104.3
Fruit and berries: import	thous. tons	72.6	71.7	83.5	80.3	78.7
Fruit and berries: export	thous. tons	4.0	2.8	3.2	2.2	1.7
Sugar: import	thous. tons	154.7	159.1	152.5	158.0	121.4
Sugar: export	thous. tons	131.7	129.8	169.9	148.2	76.6
Vegetable oil: import	thous. tons	92.9	87.9	79.4	72.7	80.9
Vegetable oil: export	thous. tons	101.6	105.4	49.0	97.3	91.3
Eggs and egg products: import	mln. pcs	120.2	101.8	64.2	184.8	245.4
Eggs and egg products: export	mln. pcs	118.2	92.5	98.9	90.7	90.9
Fish and fish products: import	thous. tons	13.9	14.7	16.8	17.3	19.6
Fish and fish products: export	thous. tons	0.1	0.4	0.5	0.5	0.6

Source: Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013

Stavropol Krai is deeply integrated into the inter-regional and international markets. Majority of agricultural products and food comes to the regional market from other regions of Russia, as well as from the CIS and other foreign countries. Region is supplied with vegetables and fruit produced in neighbouring areas with more favourable conditions for their production (Krasnodar Territory, the Republic of Dagestan, the Republic of North Ossetia–Alania, Volgograd region, etc.), China, Israel, and Europe. Eggs come from Nizhny Novgorod and Rostov regions, Krasnodar and Perm territories, the Republic of Tatarstan. Milk and dairy products, meat and meat products, other food are imported from Krasnodar Territory, Rostov region, Republic of Karachaevo - Cherkessia, Republic of Belarus, EU countries, Baltic States, China, Israel and other countries. The balance of export and import of basic food groups is presented in Figure 3.

Figure 3. Balance of export and import of food products according to the regional statistics department of the Stavropol Krai (in 000 tons)



Source: Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2012

These data demonstrate that the products of grain processing, meat and meat products, milk and dairy products are commonly imported, while the supply of potatoes, vegetables, fruits and berries, eggs and egg products, sugar, fish and fish products are exported.

Despite the certain level of unsatisfied domestic needs, in 2012, the region exported 19% of vegetables, 11% of eggs, fruit, and sugar (Table 5). The main distribution channels for fruits and vegetables are the regions of the Central Federal District, for meat – the republics of the North Caucasus Federal District, for grain – other regions of Russia and foreign countries.

The significant scopes of counter deliveries of the same product groups are explained by the fact that the export of agricultural raw materials and low added value food imports advanced processing dominated in the balance of import-export products (Tables 4 and 5). It characterizes by the low level and significant reserves of the development of the food industry.

Table 5. Export and import of basic foodstuffs by producing and wholesale organizations of the Stavropol Krai (in tons)

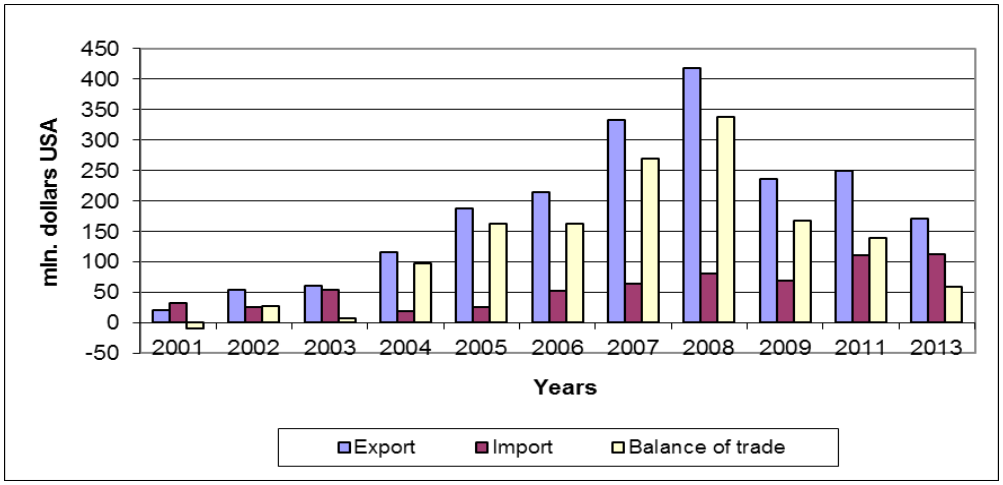
Product group	2005		2009		2010		2011	
	export	**import**	**export**	**import**	**export**	**import**	**export**	**import**
Canned meat, thous. cond. cans	5,186.0	1,010.0	3,170.0	2,126.0	66.3	713.0	2,526.0	1,014.0
Meat	465.0	16,914.0	893.0	20,624.0	902.0	22,577.0	949.0	23,275.0
Cheese	499.0	1,487.0	2,590.0	510.0	1,361.0	1,764.0	1,606.0	555.0
Butter	316.0	471.0	691.0	887.0	362.0	650.0	970.0	772.0
Flour	50,400.0	3,800.0	88,200.0	1,400.0	160.0	4.1	162.0	3.2
Cereals	14,014.0	1,447.0	13,849.0	1,629.0	298,100.0	62,100.0	812,700.0	117,400.0
Sugar	93,616.0	31,578.0	102,837.0	20,922.0	108,351.0	36,562.0	132,100.0	42,782.0

Source: authors' development based on (Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2012)

The industrial and logistics infrastructure of the regional agricultural market are underdeveloped, which hampers manufacturers to manage their sales and promotion in an effective manner. The lack of storage facilities forces manufacturers to market their products during the very first months after harvesting, which means the lowest price. The absence of loading nodes prevents the creation of large quantities of products to participate in the exchange trade, export deliveries. As a result, the local market is not saturated, and agricultural producers receive less income.

The largest suppliers of agricultural and food products to the regional market are other regions of Russia and foreign countries. The share of imports in the foreign trade of Stavropol Region in the group of foodstuffs and agricultural raw materials for the last five years has been increasing from 16 to 39.5%. Nevertheless, Stavropol region has trade surplus (Figure 4). In 2008, excess of exports over imports peaked (337 million USD) in 2013, the difference was 59.2 million USD.

Figure 4. Trade balance of Stavropol Krai in the group of foodstuffs and agricultural raw materials



Source: authors' development based on (Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013)

The export to CIS countries accounts for over 80% of foreign supplies and has steadily tendency to increase. The largest suppliers of regional food market are Egypt, Iran, Turkey, and Austria.

The main characteristic of the regional agri-food export is its high concentration on few commodities. Stavropol Krai traditionally sells wheat, including durum, barley, maize, wheat flour. Sunflower seeds, live sheep, greasy wool, poultry, and pasta are exported in small amounts and occasionally.

The so-called primary products dominate in exports. The outputs of refined products, ready-to-eat, are insignificant. This leads to a conclusion that they are not competitive in the international market, and also points to the untapped potential of improving the competitiveness of regional agriculture through the development of the processing industry.

The important area of export expansion is the growing sector organic farming, including grain products. The demand for such products is now extremely high and, primarily, by the people of those countries which, because of limited natural resources, forced into ever more intensive farming methods and livestock breeding, concentrating the use of mechanization, application of chemicals and irrigation in a limited area, for example, the countries of the Southeast Asia.

Food products and raw materials are mainly imported from foreign countries (63%); CIS countries account for 37% of shipments. The vegetables, fruits, meat and meat products, fish and fish products, alcoholic and non-alcoholic beverages are highlighted as the part of the import.

Table 6. Share of imports in the formation of the main types of food resources (in %)

Groups of goods	2008	2009	2010	2011	2012	Deviation of 2012 by 2008, percentage points
Meat and meat products	16.6	12.9	16.2	14.9	33.1	16.5
Milk and dairy products	3.1	5.0	6.0	4.3	4.2	1.1
Potatoes	29.3	32.1	20.8	21.4	16.1	-13.2
Vegetables and melons food	38.7	39.7	30.3	31.0	17.0	-21.7
Fruits and berries	44.7	45.1	47.2	45.8	46.9	2.2
Eggs and egg products	12.7	10.9	6.7	17.1	22.9	10.2
Fish and fish products	62.6	63.1	65.9	65.5	65.6	3.0

Source: authors' development based on (Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013)

The regional market is the most dependentfrom import of fruits (share of imports ranges from 44.7 to 46.9%), and fish (over 65%), (Table 7). In the dynamics observed a twofold reduction on import of potato and vegetables, essential uvelchenie on imports for meat (twofold), eggs (1.8 times), milk (from 3.1 to 4.2%). During the past five years the import dependence has increased (meat 2.5 times, milk – by 1.4 times, eggs – by 1.7 times, eggs – by 10 percentage points). At the same time there was a significant reduction of import dependence in the consumption of potatoes and vegetables (Table 7).

Table 7. Share of imports in the consumption of basic foodstuffs (in %)

Groups of goods	2008	2009	2010	2011	2012	Deviation of 2012 by 2008, percentage points
Meat and meat products	23.4	17.7	21.5	20.9	58.1	34.7
Milk and dairy products	3.5	5.8	6.8	5.0	4.9	1.4
Potatoes	36.0	39.2	24.0	26.1	20.1	-15.9
Vegetables and melons food	43.5	45.5	34.0	41.3	22.7	-20.8
Fruits and berries	52.6	52.6	55.6	53.8	55.3	2.7
Eggs and egg products	14.7	12.2	7.5	18.8	25.3	10.6
Fish and fish products	74.3	73.5	77.4	77.6	78.1	3.8

Source: authors' development based on (Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013)

It should be noted that the saturation of needs in food by their individual types is undervalued. The comparison of actual food consumption with evidence-based standards approved by the Ministry of Health and Social Development of the Russian Federation from 08.02.2010 "On approval of recommendations on rational norms of consumption of foods that meet the modern requirements of a healthy diet," suggests that the physiological needs of the population in milk, fish, fruits are satisfied less than 100%. For milk the level of satisfaction of physiological needs is – 64%, fish – 35% fruit – 39%. The deficiency of these products is partly offset by excessive consumption

of bread, vegetable oils and potatoes (Table 8). Thus, the consumption of bread exceeds the norm by 43%, potatoes – by 23%, vegetable oil – more than 70%.

Table 8. Consumption of staple food per capita per year, Stavropol Krai (in kg/person)

Types of products	2000	2005	2009	2010	2011	2012	Recommended volumes
Meat and meat products (including by-products category II and fat, raw)	39.0	48.0	61.0	65.0	67.0	73.0	70-75
Milk and milk products	175.0	188.0	191.0	206.0	206.0	210.0	320-340
Vegetable oil	13.5	14.5	16.3	17.2	19.0	19.1	10-12
Bread and bakery products	125.0	138.0	140.0	144.0	144.0	143.0	95-105
Potatoes	71.0	105.0	118.0	116.0	120.0	123.0	95-100
Vegetables and melons food	80.0	101.0	126.0	139.0	146.0	159.0	120-140
Fruits and berries	30.0	32.0	37.0	40.0	40.0	37.0	90-100
Eggs, pieces	226.0	252.0	270.0	287.0	290.0	295.0	260
Fish and fish products	7.0	7.0	7.8	7.8	8.0	7.0	18-22
Sugar	42.0	51.0	53.0	54.0	55.0	50.0	24-28

Source: Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013

The current pattern of consumption is determined by the degree of market saturation, economic availability of certain foods, and income level.

Calculations show that the average income per capita of the population in Stavropol Krai during the study period is below the average level. In 2012, it accounted for 73% of the Russia's average and 7-20% lower than the revenue in the neighbouring regions (Table 9).

Table 9. Average income per capita of the population (in RUB per month)

Region	2000	2005	2008	2009	2010	2011	2012	The role played in the Russian Federation 2012
The Russian Federation	2,281	8,088	14,864	16,895	18,951	20,755	23,058	x
Stavropol Krai	1,405	5,117	9,746	11,244	13,016	14,440	16,877	57
Krasnodar Krai	1,563	5,545	11,906	13,752	16,892	18,796	21,077	27
Rostov region	1,653	6,360	12,028	12,800	14,647	16,010	17,987	45

Source: Federal Service of State Statistics of the Russian Federation

According to the level of cash income per capita Stavropol region occupies 62ndplace in the country, while Krasnodar region – 25th, and Rostov region –44th.

In an inflationary environment, the dynamics of the value of cash income is not sufficient to objectively reflect the change in the real level of material well-being of the population. To obtain more precise conclusions the ratio of cash income to subsistence level should be considered (Table 10).

Table 10. Number of people with incomes below the subsistence level (in %)

Region	2000	2005	2006	2007	2008	2009	2010	2011	2012
The Russian Federation	29.0	17.8	15.2	13.3	13.4	13.0	12.5	12.7	10.9
Stavropol Krai	45.2	24.9	22.1	19.1	20.2	19.7	18.5	18.3	14.0
Krasnodar Krai	43.7	26.3	22.6	19.4	17.7	18.5	15.2	13.5	11.7
Rostov region	33.1	18.3	18.5	16.0	14.9	16.0	14.9	15.2	13.1

Source: Federal Service of State Statistics of the Russian Federation

These data suggest that the level of material well-being of residents of the territory for the past twelve years actually increased. The population with incomes below the annual increase, the subsistence level was reduced from 45.2% to 14%. However, the proportion of poor people remains high and exceeds its share of the average in Russia and in neighbouring regions.

As the data in Table 11, indicates 70% of the territory's population have incomes up to 19 thousand RUB, while in the Russian Federation, their share is 55.6%, in Krasnodar region – 60.2%, and in Rostov region – 67%.

Table 11. Distribution of population by capita income in 2012 (percentage of total population of the subject)

Region	Per capita income (in RUB per month)							
	below 5,000	5,000 -7,000	7,000 - 10,000	10,000 -14,000	14,000 – 19,000	19,000 - 27,000	27,000 - 45,000	over 45,000
The Russian Federation	5.8	6.9	12.0	15.4	15.5	16.7	17.1	10.6
Stavropol Krai	9.0	10.2	16.3	18.4	16.1	14.5	11.3	4.2
Rostov region	8.5	9.5	15.3	17.7	16.0	15.1	12.6	5.3
Krasnodar Krai	7.3	8.0	13.3	16.1	15.5	15.9	15.3	8.6

Source: Federal Service of State Statistics of the Russian Federation

According to a sample survey of households, 35% of the population of Stavropol Krai spends to the purchase of food. This means that in order to meet the needs of the population, agricultural-production markets of the territory should be largely focused on economically affordable products.

At the same time, the number of more affluent populations has steadily increased (Table 12). Thus, the proportion of people with incomes above 25,000 RUB has increased over the past five years, from 0.3% to 18.1%. The income differentiation coefficient, calculated as the ratio of 20% of the wealthiest population to 20% of the less advantaged, for the last 8 years has increased from 11.7 to 13.1, indicating an increasing differentiation of income and is a signal for the expansion of market segments and better quality expensive food.

Table 12. Distribution of the population of the Stavropol Krai according to their financial income

Group with per capita income per month, RUB	2005		2008		2012	
	thous. people	as percentage of total	thous. people	as percentage of total	thous. people	as percentage of total
below 2,000	412.7	15.1	80.8	2.9	12.2	0.4
2,000 – 4,000	937.0	34.2	420.4	15.2	125.1	4.5
4,000– 6,000	616.3	22.5	517.0	18.7	250.2	9.0
6,000 – 8,000	337.5	12.3	442.0	16.0	302.5	10.8
8,000 – 10,000	182.8	6.7	337.7	12.2	301.4	10.8
10,000 – 15,000	179.1	6.5	499.5	18.1	620.2	22.3
15,000 – 25,000	65.2	2.4	336.2	12.3	671.4	24.1
over 25,000.0	10.5	0.3	126.1	4.6	504.0	18.1
Population, total	2,741.1	100.0	2,759.7	100.0	2,787.0	100.0
Income differentiation coefficient (coefficient of assets), times		11.7		12.7		13.1

Source: authors' development based on (Territorial Body of the Federal Service of State Statistics of the Russian Federation in Stavropol Krai, 2013)

The suspension of imports exacerbates the problem of mobilizing all the potential to build up domestic food production. In the new circumstances, it is necessary to diversify the structure of production, to deepen its processing, to expand the range of final products, supplying the domestic market and beyond the territorywith goods with high added value. One of the immediate tasks in this regard is to create a full infrastructure for production, storage, marketing and processing of fruits and vegetables.

Conclusions

The key point among the strategic directions of development of the meat and dairysub-complexesis takenby the concentration, specialization in livestock production and combination of large and small-scale production.

The greater importance is given to the development of the market of raw milk, which implies social, economic, financial, technical and technological, information and marketing support to all actors in this market (households in different categories).

Its strategic importance for the region will keep the grain market. To meet the growing domestic demand and stable export, substantial modernization of warehousing, transport infrastructure and logistics system – procurement, logistics, primarily elevator industry are needed. The urgency of this problem is related more to the fact that a large territory of the region is located in the zone of risky soil cultivating and years with good harvest alternate with barren, arid ones. In such a situation is of paramount importance possibility of long-term high-quality storage of large amounts of grain to guarantee the satisfaction of domestic and export commitments in the lean years.

The development and strengthening of their own brands is promising, for goods which are

imported from other regions will not be absolute substitutes from the consumer point of view; the development of the Stavropol brand in a foreign market by providing products of grain production, processing of poultry and vegetable oil.

Increasing the volume of sales may also be due to intra-differentiation of production into quality products targeting different (high, medium, low) levels of consumer income.

The increase in commodity products will contribute to the development of integration relations between subjects of agri-food market, a better use of the opportunities of cooperation. It is advisable to extend the coverage of sector unions, including the consolidation of the efforts of small producers, the development of a network of procurement, supply and marketing, processing and credit of agricultural consumer cooperatives.

In the light of the implementation of government objectives for import substitution in the region the program of priority measures for the development of agriculture, including raising additional funds from the federal budget was adopted. The program is aimed at improving the investment climate, business support, innovation, the development of an information network, providing state garanitees in the markets.

The implementation of these measures should, in the three-year period, significantly increase the production of agricultural products and foodstuffs, ensure food security, improve the balance of the food market of the territory and enhance the possibility of suppling to other regions of Russia.

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ECONOMIC AND AGRONOMIC ANALYSIS OF CONVENTIONAL AND ORGANIC CONCEPT OF CUCUMBER GROWING

Nenad Pavlović[1], Milan Ugrinović[2], Boško Vojnović[3], Jovan Rudež[4]

Summary

Contemporary agro-technology enables high and stabile yield of slicing cucumber throughout the whole year. This study deals with total costs of production, yield per surface unit and the main parameters of profitability of producing slicing cucumber in the greenhouses and in the open field in conventional and organic farming system. Growing cucumbers in the greenhouses and in accordance with the principles of organic farming are the main conditions for higher prices in the market. The highest total costs (820.00 EUR/are) but also the highest gain (225.00 EUR/are) was realized in producing slicing cucumber both in the greenhouse in the organic farming system. Financial losses were recorded when growing cucumbers in the open field despite lower costs, both in organic and conventional system of growing: 29.00 EUR/are, i.e. -15.00 EUR/are, respectively. The business rate of profitability and the coefficient of cost-effectiveness were higher in growing cucumber in greenhouses in both concepts of production.

Key words: *cucumber, profit, business rate of profitability, greenhouse, organic production.*

JEL: *Q16*

Introduction

Cucumber (*Cucumis sativus* L.) in Serbia is cultivated in the open field and in greenhouse, at the surface of 8,800 ha, with average yield 6,271.20 kg/ha (FAO, 2012). There are genotypes that are suitable for proceeding and pickling and genotypes for fresh consumption, so-called slicing cucumber (Staub et al., 2008). Pickling cucumbers in Serbia are mostly grown in the

1 Nenad Pavlović, Ph.D, Research Associate, Institute for Vegetable Crops, Karađorđeva Street no. 71, 11420 Smederevska Palanka, Serbia, Phone: +381 26 317 170, Email: npavlovicpb@gmail.com

2 Milan Ugrinović, B.Sc, Institute for Vegetable Crops, Karađorđeva Street no. 71, 11420 Smederevska Palanka, Serbia, Phone: +381 26 317 170, E-mail: milan.ugrinovic@gmail.com

3 Boško Vojnović, Ph.D., Associate Professor, High School of Agriculture, Vojvode Putnika Street no. 56, 15000 Šabac, Serbia, Phone: +381 15 344 580, E-mail: bosko_v@open.telekom.rs

4 Jovan Rudež, M.Sc., Ministry of interior of Republic of Serbia, Sector for Emergency Situations Smederevo, Unit Smederevska Palanka, Ive Bajazita Street no. 14, 11420 Smederevska Palanka, Phone: +381 66 808 57 00, E-mail: jovan.rudez@gmail.com

open field, while slicing cucumbers are usually grown in house gardens or in greenhouses.

The cucumber is originally from Southern Asia, but now grows on most continents thanks to the new growing technologies. Nowadays it can be grown even in agro-ecological conditions that are not suitable for normal growth and development of this species (Pavlović et al., 2002). Contemporary agro-technical measures enable high yield of slicing cucumber in greenhouses. In temperate climate, in conditions without artificial light it is possible to achieve yields of up to 2,000.00 kg/are (Mao et al., 2003; Mohammadi and Omid, 2010). In organic slicing cucumber production in greenhouse and in Mediterranean climate, yields were up to 1,784.00 kg/are (Tuzel et al., 2007).

In Serbian agro-ecological conditions, slicing cucumber is grown from the nursery or from the direct sowing. Producers can plan time of maturity and in this way produce the most profitably. Direct sowing is performed at the end of April and at the beginning of May when also seedling is planted in the open field. Seedling can be produced during winter months in greenhouses with additional heating. Seed in greenhouses without additional heating can be sown at the beginning of April, while the yield can start in approximately 40 days (Damjanović et al., 2005). In this period the prices of the slicing cucumber are usually higher than at the end of June and the beginning of July, which is the period when cucumber yields in the open filed (STIPS, 2013).

In order to obtain higher prices in the market, the significant point could be the certificated organic production. Organic production implies ecological management of production, improvement of biodiversity, circulation of matter in the nature, microbiological activity in land and environment protection (Zdravković et al., 2010). Due to fears of harmful substances, pesticide residues and heavy metals in vegetables, many consumers are ready to pay from 30 to 80% more for certified organic products. Due to higher prices of organic products, certified organic production is more profitable despite lower yield and higher costs of production (Engindeniz 2002; Adžić et al., 2010).

The aim of this study was to research the profitability of growing slicing cucumber in greenhouses without additional heating and in the open field in organic and conventional way since these are two actual concepts of growing vegetable.

Material and methods

In order to research the profitability of slicing cucumber production according to concept of conventional and organic crop production, the trial was set at the research field and in the greenhouse at the Institute for Vegetable Crops, Smederevska Palanka. Standard methods of cucumber growing (both concepts) were applied. Data regarding the prices of material were collected from certified organic producers from Stara Pazova and Belgrade. Data regarding the costs of production and yields from certified organic production were collected by interviewing method (Pavlović et al., 2010; Pavlović, 2014).

The cucumber was grown in greenhouses without additional heating both at the Institute for Vegetable Crops and at the interviewed producers. The cost of greenhouse construction and

plastic sheeting were calculated by dividing their rates with the predicted lifetime expressed in years (Table 1), (Pavlović, 2014).

Selling prices of slicing cucumber produced in conventional concept of growing were taken from the wholesale market. Sale price of fruits produced in the organic concept were collected by interviewing salesmen from Belgrade and Novi Sad that produce and sell the certified organic vegetable (Pavlović et al., 2010; STIPS, 2013).

Economic analysis was performed by applying method of analytical calculations (Bošnjak and Rodić, 2010) in order to establish the cost price and calculate the basic parameters of profitability of slicing cucumber production. The total cost (EUR), value of production (EUR/are), cost price (EUR/kg), financial results (EUR/are), border of profitability (kg/are), business rate of profitability (%) and coefficient of cost-effectiveness (e) were calculated.

Results and discussion

Production costs directly affect the profit and manufacturers tend to reduce them as much as possible. For successful production management, managers must always know the costs, as well as their structure and dynamics (Kay et al., 2008). The highest production costs (820.00 EUR/are) were in the organic cucumber production in greenhouses. The costs of conventional production in greenhouses were 529.00 EUR/are. The lowest costs were both in conventional and organic production in the open field 264.00 and 405.00 EUR/are. The total costs of greenhouse production are higher due to the purchase of a greenhouse. During production in greenhouses more human labour is required and specialized machinery costs are increased. Insight into individual costs and the share of these costs in the total production structure are important for decision making, because the economic analysis of production can recognize the dominant group costs, which largely affect the cost of the finished goods (Kanisek et al., 2008).

Cost structure (Table 1) shows that the highest individual cost in both ways of production is the supply of plant material. Quality seedling is a condition of safe and stable production. This cost can be further increased with the organic concept of growing of slicing cucumber, since it is necessary to provide certified organic nursery (Ugrenović et al., 2010). Significant share in the total costs is the protection of plants from pests and diseases. Cucumber is extremely sensitive to plant pathogens so this problem can only be overcome by growing varieties resistant to economically most significant pathogens in Serbia (Mijatović et al., 2001). This would significantly affect the increase the profitability through reducing costs.

During this study, the yield in the greenhouse was 1,450.00 kg/are in conventional system and 1,100.00 kg/are in organic, which is in accordance with some authors (Mao et al., 2003; Tuzel et al., 2007; Mohammadi and Omid, 2010).

Table 1. Total costs of conventional and organic slicing cucumber production in the open field per surface unit (EUR/are)

Costs	Conventional		Organic	
	Greenhouse	Open field	Greenhouse	Open field
	EUR/are	EUR/are	EUR/are	EUR/are
Mineral fertilizer	34.00	34.00	0.00	0.00
Manure	0.00	0.00	5.00	5.00
The removal of manure	0.00	0.00	15.00	5.00
Primary treatment	10.00	5.00	10.00	5.00
Seedling	150.00	80.00	200.00	100.00
Additional treatment	5.00	2.00	5.00	2.00
Preparation for planting	5.00	2.00	5.00	2.00
Greenhouse construction 1/10*	40.00	0.00	40.00	0.00
Plastic foil 1/2*	50.00	0.00	50.00	0.00
Support for the plants	20.00	0.00	20.00	0.00
Foliar fertilizer	5.00	5.00	0.00	0.00
Row crop cultivation	5.00	1.00	5.00	1.00
Irrigation	10.00	5.00	10.00	5.00
Irrigation system	80.00	40.00	80.00	40.00
Seasonal labour	25.00	15.00	35.00	20.00
Approved pesticides	90.00	75.00	140.00	120.00
Certification costs	0.00	0.00	200.00	100.00
Total costs	**529.00**	**264.00**	**820.00**	**405.00**

Source: According to personal research, Pavlović, 2014.
Note: *1/10 - time of depreciation is 10 years; *1/2 - time of depreciation is 2 years.

Yield in the open field was 940.00 kg/are in conventional and 780.00 kg/are in organic production. Due to climatic conditions and the need for the additional heating, the cucumber production in the open field starts later and the vegetation period and the period of fruiting are shorter, comparing to greenhouse production, which directly influences the total yield of the fruits (Lešić et al., 2004).

Prices of agricultural products are in connection with supply and demand (Babović et al., 2011; Knežević and Popović, 2011). Prices are higher during spring when plants from greenhouses fructify. During summer, when fruits from the open field are yielding, prices are much lower due to a higher supply (STIPS, 2013). Certified organic products, regardless to time of selling are more expensive because the demand is still higher than the supply (Table 2).

Table 2. Yield per area unit (kg/are), price per unit (EUR/kg), the value of production (EUR/are)

Indicators	Conventional		Organic	
	Greenhouse	Open field	Greenhouse	Open field
Yield (kg)	1,450.00	940.00	1,100.00	780.00
Price (EUR/kg)	0.45	0.25	0.95	0.50
Production value (EUR/are)	652.50	235.00	1,045.00	390.00
Financial results (EUR/are)	123.50	-29.00	325.00	-15.00

Source: According to personal research, Pavlović, 2014.

The aim of business is to decrease the expenses and increase total value of production and work more profitably in this way. The greatest value of production was achieved in organic cucumber growing in greenhouse (1,045.00 EUR/are). Conventional cucumber growing in greenhouse gained 652.50 EUR/are. In organic growing in the open filed, the value of production was 390.00 EUR/are. The value of production was the lowest in conventional growing in the open filed: 235.00 EUR/are. The total costs in the open field in both concepts of growing exceed the value of production, so the losses were recorded both: - 29.00 and -15.00 EUR/are, respectively (Table 2). According to our research, it is possible to gain profit in organic farming in the open field, if the production is increased. Organic cucumber production in greenhouses was more profitable (225.00 EUR/are) than conventional (123.50 EUR/are).

The attractiveness of vegetable production lies in the rapid turnover of capital, which makes it very interesting for small producers (Pavlović et al., 2010).

Economic efficiency is the indicator of economic management. In our research, the coefficient of economic efficiency was 1.23 and 0.89 for conventional and 1.27 and 0.96 for organic concept (Table 3). If the calculated value was higher than 1 the total success of production was higher.

The aim of the economic management is to decrease the costs and to increase total value of production and work more economically efficient.

In our analysis, the conventional growing of slicing cucumber, in greenhouses, on 1,450.00 kg/are, and with selling price 0.45 EUR/kg, the production value was 652.50 EUR/kg. The costs of this production were 529.00 EUR/are, and the gain was 123.50 EUR/are. Conventional production in the open field was with losses (Table 2). Similar results were calculated by Tuzel et al. (2007) and Mohammadi and Omid (2010). On the other hand, organic growing, in the greenhouses, yielded 1,100.00 kg/are and had a price at the market 0.95 EUR/kg, which makes the total value of production: 1,045.00 EUR/are (Table 2). Total costs in this way of production were 820.00 EUR/are, and the gain was 225.00 EUR/are. In this concept of growing, the losses were in the open field production (Table 2).

Table 3. Indicators of profitability of production of conventional and organic slicing cucumber production

Indicators	Conventional		Organic	
	Greenhouse	Open field	Greenhouse	Open field
Total costs (EUR/are)	529.00	264.00	820.00	405.00
Production value (EUR/are)	652,50	235.00	1,045.00	390.00
Cost price (EUR/kg)	0.36	0.28	0.74	0.52
Financial results (EUR/are)	123.50	-29.00	225.00	-15.00
Break-even point (kg/are)	1,175.55	1,056.00	863.20	810.00
Rate of return (%)	18.90	-12.30	21.50	-3.85
Coefficient of cost-effectiveness (e)	1.23	0.89	1.27	0.96

Source: According to personal research, Pavlović, 2014.

Profitability threshold in conventional greenhouse production was 1,175.55 kg. In the organic greenhouse growing, the profitability threshold was 863.02 kg. The difference between yield and profitability threshold, in the first case (274.45 kg/are and 236.80 kg/are) clearly points the profitability of the ways of production mentioned above.

Conclusion

Analytical calculation of slicing cucumber growing, in conventional and organic production, proved that it can be profitable, except when growing in the open field in the conventional concept. Relevant parameters of successful production in conventional concept of growing in greenhouses and in the open field are the coefficient of cost-effectiveness 1.23 and 0.89. In organic concept of growing this coefficient was 1.27 and 0.96. Business rate of profitability for the first concept of growing was 18.90 % and -12.30 %, and in second (organic) 21.50 % and -3.85 %. The highest gain (996 EUR/are), was organic greenhouse production. The only production with losses was conventional open field production. These parameters unequivocally show that producers should turn to organic concept of growing of slicing cucumber.

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EKONOMSKA I AGRONOMSKA ANALIZA GAJENJA KRASTAVCA PO PRINCIPIMA KONVENCIONALNE I ORGANSKE BILJNE PROIZVODNJE

Nenad Pavlović[5], Milan Ugrinović[6], Boško Vojnović[7], Jovan Rudež[8]

Rezime

Savremenim agrotehničkim merama može se postići visok i stabilan prinos svežeg salatnog krastavca tokom cele godine. U radu su prikazani troškovi proizvodnje, prinos po jedinici površine i osnovni pokazatelji profitabilnosti proizvodnje salatnog krastavca u zaštićenom prostoru i na otvorenom polju, u konvencionalnom i organskom sistemu zemljoradnje. Gajenje u zaštićenom prostoru i u skladu sa principima organske zemljoradnje, proizvođačima omogućava postizanje viših cena na tržištu. Najveći troškovi 820 EUR/a, ali i najveća dobit 225 EUR/are, ostvareni su pri proizvodnji salatnog krastavca u zaštićenom prostoru u organskom sistemu gajenja. Pri gajenju krastavca na otvorenom polju, uprkos nižim troškovima zabeležen je gubitak i u organskom i u konvencionalnom sistemu gajenja, -29 EUR/are odnosno -15 EUR/are respektivno. Vrednosti stope rentabilnosti poslovanja i koeficijenta ekonomičnosti bile su veće pri gajenju krastavca u zaštićenom prostoru kod oba koncepta biljne proizvodnje.

Ključne reči: *krastavac, dobit, stopa rentabilnosti, zaštićen prostor, organska proizvodnja.*

5 Dr Nenad Pavlović, naučni saradnik, Institut za povrtarstvo, Karađorđeva 71, 11420 Smederevska Palanka, Srbija, Telefon: +381 26 317 170, E-mail: npavlovicpb@gmail.com

6 Milan Ugrinović, dipl. inž., Institut za povrtarstvo, Karađorđeva 71, 11420 Smederevska Palanka, Srbija, Telefon: +381 26 317 170, E-mail: milan.ugrinovic@gmail.com

7 Dr Boško Vojnović, vanredni profesor, Visoka poljoprivredna škola strukovnih studija, Vojvode Putnika 56, 15000 Šabac, Srbija, Telefon: +381 15 344 580, E-mail: bosko_v@open.telekom.rs

8 Jovan Rudež, M.Sc., MUP RS, Sektor za vanredne situacije Smederevo, VSJ Smederevska Palanka, Ive Bajazita 14, 11420 Smederevska Palanka, Telefon: +381 66 808 57 00, E-mail: jovan.rudez@gmail.com

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PRACTICAL RESEARCH RESULTS OF A SUCCESSFUL COMPANY'S APPEARANCE AT THE FAIR

Nedeljko Prdić[1], Boris Kuzman[2], Miljana Barjaktarović[3]

Summary

Trade fairs represent a hot subject in the contemporary theory, as well as in the contemporary practice of modern successful international and local enterprises, organisers and owners of exhibition space. The domestic literature provides certain sources and papers which discuss the topic in theory, but there is an evident lack of strategic approach towards trade fairs as the instrument of sales improvement, as well as the obvious lack of practical approach of enterprises at trade fairs, and the lack of real measurement of the results obtained.

This paper proves that the representation on a trade fair had positive effect on the sales results, as well as on the creation of interest and the increase of awareness of the existence of a company and its products. The analysis proves that under certain conditions the gain rate on the investment is calculable and quantifiable, in the case of trade fair representation.

Key words: *trade fairs, wine, costs, effects of appearance.*

JEL: *Q13*

The research topic and research objective

The research topic is appearance of an enterprise at trade fair and its effects on the results of the company's sales. The professional communication of an enterprise at trade fair and successfully concluded sales cane be defined as a skill of representing products and/or services in a way so attractive and efficient that the buyer feels immediate and direct pleasure caused by product or service, and that the result of the whole process is the decision of buying (Prdić, 2009).

This research is aimed to conclude what is the rate of profit on the investment done by an enterprise which appears at a trade fair and introduces two of the new products. The basic

1 Nedeljko Prdić, Ph.D., JKP Tržnica, Žike Popovića Street no. 4, 21000 Novi Sad, Serbia, Phone: +381 63 500 818, E- mail: ekonomistdoo@sbb.rs

2 Boris Kuzman, Ph.D., Research Associate, Faculty of Agriculture, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 63 590 129, E-mail: kuzmanboris@yahoo.com

3 Miljana Barjaktarović, Ph.D., Professor, Alfa University, Palmira Toljatija Street no. 3, 11000 Belgrade, Serbia, Phone: +381 69 441 06 20, E-mail: miljana.barjaktarovic@alfa.edu.rs

objective of this paper is to establish what is the rate of profit on the investment which is made by a company appearing at a trade fair, in terms of positive effects on the results of the company's sales.

The objective of the research is establishing solid ground for future researches, both theoretical and empirical, which will show in practice all their validity based by certain statistical and other methods that can be utilised in practice and possibly point out to certain causal relationships.

Methods of research

This paper uses, amongst other methods, the comparative method of marketing research, which represents a combination of historical method and examination method. Special methods of cognition and acquiring knowledge are both analysis and synthesis, methods of statistical data processing, and the data are represented visually by tables and diagrams. The traditional application of a historical method viewed from the angle of a company that exhibits at a trade fair, is marked and established by inertia which is shown in following and comparing costs from the last year's appearance, augmented by changes from this year, or, rhetorically speaking, represented by fear that the competitor's company will appear at trade fair and by this appearance it will endanger the market position of our company if our company fails to appear at the trade fair in question. It causes our company to be forced to appear too. Modern approach assumes using trade fair as an instrument for sales improvement in order to achieve competitive advantage, treating costs of the trade fair appearance as an investment. As in the other instruments of competitive advantage, marketing communication and sales improvement, it is needed to establish the rate of profit on the investment, and the rate mentioned is produced by a company's appearance at trade fair. A special method of calculation for the quality/price ratio is metha-regression analysis, which uses scale from 1 to 100 to assess the quality (Oczkowski, Doucouliagos, 2014).

As in the other instruments of competitive advantage, marketing communication and sales improvement, it is not clearly computable in a precise manner how big the effects of such trade fair appearance are. The possible influences that could be treated as "noise" are the influences of other instruments of marketing communication. Based upon communicational cognition and knowledge gathered from practice, i.e. from the research conducted at Novi Sad Agriculture Fair, it is possible to measure the profit rate caused by trade fair appearance with certain "assumptions".

The results of the research

The Presumptions of the Research

The need for practical measurement of the efficiency of trade fair appearance has appeared as an imminent occurrence in all companies present on the market, mostly because of the limited resources for achieving business goals. The assessment and control of the achieved targets of the company's trade fair appearance is based upon comparison of wished, targeted objectives with the achieved results. It is done by assessing the profit

rate on the investment during launching a new product on the market. It is a well-known fact that Germany is the leading country in trade fair industry in the world. From all the leading trade fairs in the individual sector, two thirds are being held in this country (www.auma.de).

If we know that the trade fairs are one of the most important instruments of sales improvement, as well as one of the leading and most effective instruments in launching new products on the market in developed countries with market economy, the objective of this research is to show practical importance of a trade fair appearance for every company in the domestic circumstances. This is the case also when we analyse the wine products. This particular analysis is being centred around the two products of the Wine Manufacturer „Vršački vinogradi", Product One being Red wine Frankovka, 0.187 litters, and Product Two being White wine Muskat, 0.187 liters. This research is conducted with the approval of the manager of the trade fair appearance of this company.

We assume the following situation:

C1. "Pure market situation": The situation which is characterised by the lack of communicational activities or by their low level. The same applies to the activities of direct sales. Elimination of such instruments of communication releases from the obligation of researching potential interconnections between different instruments of marketing communications, and enables the establishing of effects caused by the trade fair appearance to the volume of sales achieved, as well as the other communication effects. This situation can be considered realistic having in mind that the new products are being mostly launched and demonstrated mainly at trade fairs.

C2. Introducing of a new product at a trade fair: introduction of a new product at a trade fair relinquishes from the need to measure influence made by other elements of marketing communication. The advantages of products exhibited are quality, proven by the quality of geographic origins, the uniqueness of wines like *Frankovka* and *Muskat*, the own plantations of the vineyards, and one of the most important comparative advantages of the product is design which follows trends of the time. The effects of the sales and other communication results can be attributed to the company's trade fair appearance. Three months after the trade fair is the period taken for measuring effects, measured from the date of introduction of a new product on the market. The example of the Austrian wine market we see that the wine of better quality is produced by bigger companies, in comparison with smaller companies joint into societies (Pennerstorfer, Weiss, 2012).

C3. Conquering new markets and market segments. If we know that this objective of trade fair appearance is one of the most important ones, and that stands in direct proportion with launching of a new product, such market situation enables measuring of the effects and their connection with the trade fair appearance only.

C4. Market position of the company. The company that made the trade fair appearance, which also took all the steps for realization of the project of the trade fair appearance, possesses concrete data on volume of sales of a new product introduced, as well as the

data on products which were not shown nor exhibited at the trade fair, and also other communication effects of the trade fair appearance, analysed in the measured time frame needed for evaluation.

The results of the research are shown regarding measurement of economical and communicational effects. The rational measurement of results of a trade fair appearance is possible only with the assumption that the company took all the necessary steps embedded in the model of successful management of activities of a successful trade fair appearance (Prdić, 2012a).

The economic effects of such trade fair appearance, under aforementioned presumptions, would be:

Presumption 1 (P1)

- The volume of realized sales per buyer for the products exhibited at the trade fair would be bigger for the buyers that visited the stand, than the volume of realized sales per buyer for those buyers who did not visit the stand of the company.

Presumption 2 (P2)

- The increased business results (profit) resulted from the bigger volume of sales, having in mind all mentioned under 1), in the case of exhibited on the stand, will cause positive profit rate for the trade fair appearance investment.

Trade fairs are communicational and sales orientated market institutions and the exhibiting company expects positive profit rate on the invested assets, in form of increased direct sales at trade fair or in the certain time frame after the trade fair, which is in accord with our first presumption, i.e. that the increased sales must be bigger than total costs of trade fair appearance, so that the investment can be economically payable and profitable, which is then again in accord with the presumption of the appearance.

The communication effects would therefore be the following:

Presumption 3 (P3)

- Potential buyers who visited the company stand will have communicational knowledge about the company's image, as well as other direct knowledge about the product and its features, that the ones who did not visit the stand.

Presumption 4 (P4)

- Having communicational knowledge on trade fair exhibit space, visitors who visited the company stand would be more interested in a product that those who did not visit the company stand.

Most of the relevant sources from the area of marketing and marketing communications are focused on so-called hierarchy of effects of the advertising messages, where the efficient instruments of marketing communication have to have a positive effect on the initial levels in the hierarchy. This perception is in accord with aforementioned communicational

presumptions. Aforementioned presumptions are a reflexion of a conventional thinking of companies appearing at trade fairs.

In order to do the research successfully, as well as to achieve practical effects which can contribute to the positive effects in operating of domestic companies, and having in mind aforementioned presumptions and "accepted features" of economical and communicational effects that this research has to have, in C4 we will put the data of "Vršački vinogradi", since we obtained cooperativeness of the company's management. We can note that this research is just a beginning in terms of practical testing based upon precisely guided data. Therefore they have to be double-checked if the number of companies grows. This does not diminish the value and validity of this research since obtained data from various companies can always be practically utilised, all based upon this research.

Our example will be a company which produces wine products and which exhibits in a number of trade fairs or wine festivals. The biggest trade fair in the agrarian sector is the International Agricultural Fair in Novi Sad held annually, which is attended by all the relevant wine manufacturers from Serbia and wider region. Apart from the geographical origin of the wine, the factor which influences the pricing of the wine is the assessment of quality on fairs (Schamel, 2003).The aforementioned company introduced two new products at the International Agricultural Fair, Product One being Red wine Frankovka, 0.187 litters, and Product Two being White wine Muskat, 0.187 litters. Therefore the C2 Presumption. This fair is always visited and the visitors are very numerous. The number of competitors is high so it could be considered relevant for the research.

For the successful research of the indirect effect of trade fairs we need to compare the number of existing and future buyers who visited the company stand (E-experimental group which consists of company stand visitors) and those who did not visit the stand or did not visit the fair at all (G-control group). In order to fulfil the condition from the Presumption C3, we need to compare the groups of relevant dimensions.

In our case, the company contacted its existing and potential buyers one month prior to the trade fair using direct mail or e-mail about their fair appearance. The company stated that there were new products on the company stand, but did not specify which those were. The communicational activities on the company stand have shown that the company stand was visited by 1,500 visitors (by a questionnaire) who had not been previously invited to the stand. These 1,500 visitors represent the number of visitors during the trade fair and they represent the E-group. The other buyers and potential buyers who did not visit the stand represent the G-group.

The intentions of buyers to buy a certain product which was exhibited at the trade fair can be brought in accord with previous buying intentions, by the research made by a questionnaire after the trade fair. This research is important because of the fact that the visitors who were at the fair had had buying intentions for the exhibited products, much more than the potential buyer who did not visit the fair. Therefore it is possible to explain the increased sales of the company's products by the visitors of the trade fair by their increased wish to buy products. It would mean the adjustment of the achieved economic effects in this research. By this research

we need to find out the differences between the intentions of the visitors who visited the trade fair and the company stand and those who did not visit the trade fair, as well as those who visited the trade fair, but not the particular stand.

The visitors of the company stand can be existing or potential buyers and consumers. By communicating at the trade fair we can influence existing buyers because they possess a certain loyalty to the company's products, more than the potential buyers. The research of attitudes and perceptions of potential buyers is necessary to be performed prior to the trade fair, so that we can influence their buying intentions when we talk about products or services of the company, and especially the new products exhibited at the trade fair for the first time. The research has to reveal the significance of the volume of the buyers' mass, which is reflected in volume of bought products or services and which is utilised as a basic variable for calculating the significance of the buyer for the company's business. We need to emphasise that the data on the sample volume do not make any difference between the visitors who visited the fair and not visited the stand, and those who did not visit the trade fair at all.

For the successful research of the company's significance and the precise measurement of the results we can divide all buyers into small, big and potential buyers as shown in the Table 1.

Table 1. The characteristics of the trade fair visitors

Buyers' characteristics	Who visited the company stand	Who have not visited the company stand and possibly have not visited the fair at all	Total
Small	246	1,889	2,135
Big	203	1,052	1,255
Potential	1,051	10,927	11,978
Total	1,500	13,868	15,368

Source: The results of the inquiry made by a questionnaire on the stand, during the Agricultural Fair in Novi Sad, the stand of Vršački vinogradi.

1. small buyers – purchases less than 1,500 EUR during last year,
2. big buyers – purchases bigger than 1,500 EUR during last year,
3. potential buyers – have not bought products or services of the company yet.

The economic effects of a trade fair

Today the efficiency appears to be one of the basic factors that mark the business success, market position and a mere survival of the modern company. The efficiency can be defined as the measure of achieving the objective.

The value analysis of a trade fair is a kind of a report which encompasses all the buyers and confidential individual report on clients, and it is used to compare the appearance of the company and the appearance of the competition.

By analysing concrete example of this research, after finishing the trade fair, it is needed to question the visitors who visited the fair as well as the company stand. It is also needed question the visitors who did not visit the fair so that we can see what is the influence of the fair on the consciousness of the existence of the potential buyers of the product. This research has to determine the grade of consciousness for the two new products exhibited at the trade fair. In this case we need to apply the scale of ranking from 1 to 5, where 1 represents the low interest (no buying intentions), whereas 5 represents very high level of interest (high buying intentions).

Table 2. Buying intentions prior to the trade fair

Description	Buying intentions prior to the trade fair (5-level scale)	
	Arithmetic average*	Standard error
Small buyers		
-visited both fair and stand	2.74 (n = 90)	0.23
-did not visit fair	2.81 (n = 86)	0.18
Big buyers		
-visited both fair and stand	3.41 (n = 85)	0.19
-did not visit fair	3.12 (n = 80)	0.18
Potential buyers		
-visited both fair and stand	2.48 (n = 79)	0.20
-did not visit fair	2.33 (n = 72)	0.25

Source: Authors' calculation based on the survey data.

Note: *1=no buying plans; 5=very defined plans; n – number of buyers

Monthly sales results for the two new product exhibited at the trade fair are shown in Tables 3 and 4. We monitored the sales in the period of 3 months after the end of the trade fair, as per buyers' category. This period is relatively independent from the other „influences" of other trade fairs, since other such trade fairs are not being held at the same time.

Table 3. Analysis of overall monthly sales after the end of the trade fair (new products only)

Description	Overall sales/buyers (10^3 RSD)		
	May	*June*	*July*
Small buyers, visited the stand (n = 246)	11.23	17.24	24.36
Small buyers, did not visit the stand* (n = 1,889)	2.84	5.72	9.21
Big buyers, visited the stand (n = 203)	18.24	70.61	125.68
Big buyers, did not visit the stand * (n = 1,052)	18.35	29.72	43.11
Potential buyers, visited the stand (n = 1,051)	3.58	4.70	5.14
Potential buyers, did not visit the stand* (n = 10,927)	0.39	0.84	1.25

Source: Internal unpublished report on the sale of wine after the fair, Vršački Vinogradi a.d.

Note: * May have and may have not visited the trade fair; n – number of buyers.

We need to say that the period after the end of the trade fair is a bit unfavourable when we talk about the wine sales since the summertime comes, and the sales effects are generally smaller in this period. The conversations with managers have shown however

that the real economic effects are expected in the beginning of September each year. The communicational effects at the fair itself are very significant because of the cognition of the product quality by tasting it and by comparing the products with others presented at the trade fair.

In the future period after the trade fair we need to write down the product sales in the next 3 months which is in accord with the management model of the company's trade fair appearance. From the point of view of this research, this time frame is relevant due to the fact that the other manifestations are not being held.

Analysing the results it is evident that the experimental group in every month after the trade fair achieved bigger sales volume if we divide the majority of individual sales by the number of buyers, than the control group. The aforementioned results show that the average sales per buyer who bought a product are bigger among those who visited the company stand during the trade fair. We need to mention that the two products were introduced to the market exactly during the trade fair, so we do not possess previous set of data for the sales volume. The bigger sales volume per buyer in the experimental group can therefore be attributed to the effects of the trade fair. The total positive effect after the visit to the company stand, as per the number of buyers as well as per cumulative sales per buyer for every category of buyers shows consistence with the economic effects as shown in the Table 3.

Analysing the economic effects on the products sales we can calculate the profit rate on the investment for the trade fair appearance. The overall economic effect for the two new products is calculated by multiplying the value of the achieved sales per category with the average gross profit rate. The short-term profit rates on the investment in percent represent the lower value of this fair in terms of short-term sales and in that respect it respects the P2. Observing the long-term period it is possible to determine the communicational and economic effects of the trade fairs. The cumulative sales calculated in the end of every month in the 3 observed months after the trade fair is in the function of time. The value of sales in the first months rises in the end of every month and after a while it decreases.

The communicational effects of the trade fair

In the communicational terms, trade fairs are an ideal instrument for communicating which serves adequately for establishing personal contact and assure that the direct utility of the product is tangible. The way in which the buyers sense things, their decision on purchase, however, show that the picture in the public and the image show the uniqueness of the product. The building of a corporate image is needed to represent the product positively.

Trade fairs are a good instrument to measure side by side different effects of personal communication, advertising, and trade fair in different phases of the purchase process.

The overall effect of the trade fairs as an instrument of sales development is shown in communicational effects of a company which appears at the trade fair. The communicational stimuli are utilised through different cognitive levels in the process of decision making. Correlation of chemical content of the wine and human perception of taste is still insufficiently

studied (Saenz-Navajas et al., 2010). This research encompassed two phases of purchase, the consciousness of the buyer (considering the product) and the interest for the product. The measurement of the buyer's awareness after the fair is used when the goal of the fair presentation is used to improve the buyer's awareness of themselves, to launch the new product and to change the market perception (Prdić, 2012b).

Table 4. Cumulative analysis of consumers after the trade fair (new products only)

Description	Number of actual buyers*	Purchases as percent of number of buyers	Cumulative sales per buyer(10^3 RSD)
Small buyers, visited the stand (n = 246)	18	7.3 %	333
Small buyers, did not visit the stand* (n = 1,889)	65	3.4 %	268
Big buyers, visited the stand (n = 203)	47	23.2 %	543
Big buyers, did not visit the stand** (n = 1,052)	136	12.9 %	334
Potential buyers, visited the stand (n = 1,051)	21	2.0 %	257
Potential buyers, did not visit the stand** (n = 10,927)	76	0.7 %	180

Source: Internal unpublished report on the sale of wine after the fair, Vršački Vinogradi a.d.

Note: * The number of buyers shows the total number of buyers of Vršački vinogradi per category after 3 months. The possibility of double purchase is eliminated, and it may appear only as a consequence of multiple purchases in different months or due to the several purchases of both of the new products in the same months; ** May have and may have not visited the trade fair; n – number of buyers.

The research shows that the level of consciousness about the product is higher for the visitors of the stand in comparison with those who did not visit the stand. It supports the Presumption P3. The different attitudes about the products which are consequence of the difference between the levels of consciousness of those buyers, who did and did not visit the stand, can be taken as certain „certainties". When we talk about the level of interest for the products of the company, it is notable that there is a difference between the buyers who did and did not visit the fair when the categories of small and big buyers are concerned. It proves the P4.

The research proves that the potential buyers are totally coexistent with previously established presumptions in both level of consciousness and the level of interest. The bigger number of researches would give better and more relevant data.

The results of the research show that the trade fairs are the efficient instrument of sales improvement and that we can, up to some point, influence the level of interest of the buyers and the decision making on purchase. Certain papers and studies (like Ballesteret al., 2008), give a hint that the wine experts (including winemakers) would perform better in a role of

assessing the attributes of wine and its quality than the new consumers.

We can therefore conclude that the shown research made a solid ground for the efficient decision making in the process of management when the trade fair appearance is concerned, which in turn could be considered an excellent tool for sales improvement and marketing communication. Domestic companies can, by applying strategic approach to the trade fair appearances, achieve their business objectives in terms of communicational and economic effects. Domestic companies, as proven in this paper, can achieve their business objectives in terms of target groups of buyers and consumers. According to the data enlisted, it is necessary to increase the wine production with the simultaneous change of structure from the point of view of quality, and according to the market demands (Vlahović et al., 2011).

Conclusion

The results of this research show that the trade fairs can have positive profit rate on investment during trade fair appearance when the companies introduce new products on the market. It is shown that the trade fairs have significant role in later phases of the purchasing process, in creating interest for the new products exhibited at trade fairs, possible creating of consciousness about the mere existence of the product etc. The objective of this research is not a general conclusion, but we can make a partial conclusion that the trade fairs achieve positive profit rate on investments, in terms of consciousness, interest, acquiring new buyers, purchase effects compared to the costs. This situation is the most realistic in case of introducing new product on the market, which have low cost per unit. Trade fairs are accepted as a significant instrument of communication between the company and the market, but their efficiency was contested without the approval made by scientific researches. The results of any empirical or scientific research must be double checked in a large number of cases, different market situations etc. The contribution of this research can therefore be a good start in this direction.

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PRAKTIČNI REZULTATI ISTRAŽIVANJA USPEŠNOSTI NASTUPA PREDUZEĆA NA SAJMU

Nedeljko Prdić[4], Boris Kuzman[5], Miljana Barjaktarović[6]

Sažetak

Sajmovi su aktuelna tema kako u savremenoj teoriji, tako i u praksi uspešnih svetskih a u budućnosti i domaćih preduzeća, organizatora i vlasnika izložbenog prostora. U domaćoj literaturi postoje radovi koji teoretski obrađuju ovu problematiku, međutim nedostaje strateški pristup sajmu kao instrument unapređenja prodaje, kao i istraživanje praktičnog nastupa preduzeća na sajmu i merenje ostvarenih rezultata nastupa.

U radu je dokazano da je nastup na sajmu imao pozitivan efekat na rezultate prodaje kao i na stvaranje interesa i povećanje svesnosti o postojanju preduzeća i njegovih proizvoda. Analizom je utvrđeno da se pod određenim uslovima, može izmeriti i kvantificirati stopa prinosa na investiciju prilikom nastupa na sajmu.

Ključne reči: *Sajmovi, vino, troškovi, efekti nastupa.*

4 Dr Nedeljko Prdić, JKP Tržnica, ŽikePopovića 4, 21000 Novi Sad, Srbija, Telefon: +381 63 500 818, E-mail: ekonomistdoo@sbb.rs

5 Doc. dr Boris Kuzman, Naučni saradnik, Poljoprivredni fakultet, Trg Dositeja Obradovica 8, 21000 Novi Sad, Srbija, Telefon: +381 63 590 129, E-mail: kuzmanboris@yahoo.com

6 Prof. dr Miljana Barjaktarović, Alfa Univerzitet, Palmira Toljatija 3, 11000 Beograd, Srbija, Telefon: +381 69 441 06 20, E-mail: miljana.barjaktarovic@alfa.edu.rs

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PRODUCTION AND ECONOMIC SPECIFICITIES IN GROWING OF DIFFERENT GARLIC VARIETIES

Ibrahim Totić[1], Stevan Čanak[2]

Summary

Importance of garlic is enormous for both human health and cookery. Garlic is a crop whose production does not endanger the agro-system and the eco-system, which is of special significance for organic food production. Considering that growing garlic is based on the application of agro-ecological and agro-economic principles, this paper describes the soil preparation process for planting, planting technology, application of agro-technological measures. It also gives an account of the basic characteristics of the planting material, its extraction and storage. The subject of research of this paper is to determine yield of different garlic types on two different locations in Serbia. It also aims to determine costs and calculations based on variable costs, as well as to compare economic results of production of different garlic types on family-own small-scale farms.

Key words: *garlic, production technology, contribution margin.*

JEL: *L23*, *Q19*

Introduction

It is unthinkable that a modern man, occupied with his creative enthusiasm, exposed to his dynamic and daily stressful activities, can allow himself not to consume five basic products: garlic, honey, corn, apples and brandy. Each of these products possesses multiple qualities, but garlic *(Allium sativum)* is without any doubt dominant in this respect. It is interesting that high quality leeks *(Allium ampeloprasum var. porrum)* did not receive any favourable attention from farmers, and that it is still rarely being cultivated. Garlic is to vegetable growing what the walnut is to fruit-growing (Engeland, 1991), ever since the first areas of growing garlic. This is the first reason why growing garlic is the topic of this paper. The second reason is that the author himself grows it, and has special respect considering it a cult crop.

1 Ibrahim Totić, Ph.D., Assistant professor, Department for Economic sciences, State University of Novi Pazar, Vuka Karadžića nn, 36300 Novi Pazar, Serbia, Phone: +381 20 31 77 52, E-mail: itotic@np.ac.rs

2 Stevan Čanak, Ph.D., Assistant, Department for Chemical - Technological sciences, State University of Novi Pazar, Vuka Karadžića nn, 36300 Novi Pazar, Serbia, Phone: +381 20 31 77 52, E-mail: scanak@np.ac.rs

A garlic bulb consists of 8 to 12 cloves, which in their concentrated form contains more than two hundred biologically active substances (Anwar et al., 2009). Scientific research has indicated that they consist of ethereal oils, vitamins (A, B1, B2 and C), minerals (sulphur, potassium, iron, iodine, phosphorus, and selenium), amino-acids, enzymes and other components such as inuline, adenosine and alicine (Schwartz and Krishna, 1999). Garlic is used as a dietary supplement and as a medicine. Its high quality, beneficial effect and overall positive effect on human health have been known since ancient civilizations (Jones and Goebel, 2001). However, its more widespread use began after its energy, nutritional and medicinal values were scientifically proven. Increased demand for garlic led to an increase in the amount of planted garlic almost all over the world (in parts of the Mediterranean, Europe, Asia, and North America). Today modern and expansive production is primarily related to China and the United States of America, Korea, but also to other regions of the world where all the various types of garlic are somewhat unfamiliar. Thus, interest in growing garlic has been increasing, both among the buyers for the purpose of consumption and among producers as well, due to its high yield (Renoux, 2005).

Research has shown that garlic, either fresh or processed, still possesses many extraordinary health benefits. Its pungent smell (Block, 2010), which is usually referred to in a negative context, can be reduced in several ways. It is produced by allyl methyl sulphide - *AMS,* an unstable liquid (Verma et al., 2012), derived from sulphurous compounds which, as a part of metabolic processes are absorbed from the blood, travel to lungs and from there to mouth where they cause white odour (Alnaqeeb et al. 1996). Parsley, yoghurt and/or some types of alcoholic beverages are used to eliminate this odour. Even with such odour, it is an effective form of protection against various kinds of illnesses, insects, etc. (Pritts, 2009).

Aim of the paper

The very attempt to grow garlic along an area of four rows (approximately 16 m^2) on a surface of 640 m^2, seems somewhat of an adventure – before all, due to the location which spans on two municipalities; secondly, because of the different (albeit slightly) geomorphological features of the land; thirdly, because of insufficient knowledge of potential risks. Once we add to that the fact that its growth is closely related to the preservation of biodiversity, agro-biodiversity, agriculture and the overall rural area, which is the basis for multifunctional agricultural development, the goal of the paper was determined. It was formulated based on advice from modern literature (Znaor, 1996), indicating that more intense growth of all fruit and agricultural crops has a unique goal, which is to increase yield. This can only be achieved through the application of modern chemical agents which are used to protect products that are being significantly increased. The use of synthetic chemical products not only changed the structure and quality of water, air and land, but the overall environment as well. It has increased the cost of production and the time during which pesticides and herbicides remain in the newly formed products. However, no one is claiming that the increase in production is not a civilizational achievement (Berenji, 2004), but we must acknowledge the fact that the greater loss is the annual number of reported cases of pesticide and herbicide poisoning - more than three million cases with lethal outcome for

more than 220,000 people all over the world. Since garlic is only slightly dependent on the aforementioned substances, its intensive growth is a very wise choice.

It is of no use to try and obtain garlic in order to satisfy the needs based on the assumption of its multiple values, if we neglect its origin, quality and the fact that in some circumstances its consumption could be detrimental to human health (Cutler and Wilson, 2004).

Apart from pointing out the importance of garlic for people's health and cookery, the authors of this paper aimed at showing one way (technology) of garlic production on family farms in Serbia. Besides from performing an experiment under production conditions at two locations in Serbia, substantial data on achieved yield are also available. Based on the obtained data on yield, production technology and applied agro-technical measures, it is possible to perform calculations of costs of this production. By compiling calculations based on variable costs for the chosen garlic types, financial result which can be achieved in the chosen manner is shown.

Materials and methods

Over the last few years, due to the expansion of various illnesses (cancer, myocardial infarctions, diabetes mellitus and hypertension), the demand for garlic is constantly on the increase (Ried et al., 2010). One can find garlic of different origins and of wide price range in Serbia, related to both, the planting material and consumption-based garlic. Rough divisions can be made to registered garlic types of high quality, domestic unregistered types and garlic originally from China, which is mostly of poor quality and of the lowest price. Authors of this paper performed an experiment on two locations in Western Serbia with an aim to investigate yield of garlic which can be found in this part of the country on production conditions. The authors opted for one registered type of garlic of high quality (Bosut), two unregistered but present types called Zoza 51 and Visoka, as well as garlic of the unknown type originally from China.

The paper will precisely represent all the phases of growth and the preparations which had to be made prior to planting during vegetation and during the extraction of mature bulbs. All of the phases were planned with mathematical precision, from the soil preparation on the plots set aside for planting, to hanging the last garlic wreath on the nail to dry. At every step, attention was given as not to make even the slightest mistake. The first step was to select a plot on existing areas (fields) and to prepare the soil for planting. Plots which had not been used to grow any kind of agricultural crop were targeted. The plots had not been classified under Regulations for cadastral classification and land quality evaluation *(Official Gazette of the Republic of Serbia),* no. 61/2012, so we did not know which type of soil was found on the plots. No samples were taken from any of the plots prior to planting, even though the Agricultural Land Act *(Official Gazette of the Republic of Serbia),* no. 62/06, 65/08, 41/09, makes such provision). During the first week of September, agro-technical measures were taken: ploughing, the improvement in the structure and fertility of the land (the addition of humus, the improvement of biological and chemical activity) through a compulsory system of organic fertilization using solely manure. After the professional removal of smaller amounts

of stones, roots, and other unnecessary elements, during the first week of October, the soil was ploughed again so that the larger clumps of dirt could be broken down into smaller pieces and mixed in with the distributed manure. These steps were taken on plot *"A"* in Arilje, and then on plot *"B"* in Barakovac (Novi Pazar), which are at a distance of exactly 140 km from each other.

On plot *"A"* located in the municipality of Arilje (43 N 45' 02.75"; 20 E 06' 02.64"), with a size of 22.20 m in length and 18.00 m in width, that is, covering gross area of 400 m^2, access paths were provided, "sidewalks" 40 cm in width on all four sides. In addition, for the purpose of easy access, work and communication, a pathway (used for communication) was left among the rows, 45 cm in width. After these measuring, 320 m^2 were left available for planting with 48 (forty-eight) rows, each of which was 21.80 m long. For the planting of every type of garlic, 12 (twelve) rows were prepared, which were organized into planting fields. Plot *"A"* contained six planting fields whose individual surface was 53 m^2 (21.80 m x 2,45 m). The altitude of the planting plots was 342 m, and the land rich in humus was loose and there was not any extensive presence of moisture in the soil. The need for irrigation was eliminated at the very beginning. The only danger which threatened the crops in plot *"A"* was the use of chemical agents (pesticides and herbicides) which during spring are used by raspberry producers in the surrounding area to protect their raspberry shoots from insect and fungus infections.

Plot *"B"* Barakovac (Novi Pazar), (43 N 08' 29.17""; 20 E 31' 31.4") with a length of 33.50 m and a width of 12.00 m, is also bordered by access paths with a width of 40 cm on all four sides. The distance between the rows is 45 cm wide, and they were left for planting and fertilizing and the final extraction of the bulbs. After providing an area for the unimpaired movement during the performance of various activities (traffic), surface of this plot was also reduced to 320 m^2 with 32 (thirty-two) rows 32.70 m long. Eight rows were prepared for each garlic type. The surface prepared for planting had 4 (four) planting fields covering an area of 80 m^2 (32.70 m x 2.45 m). The altitude of the plot was 497 m. An interesting fact is that the plots planted in Arilje and in Novi Pazar are located at the same altitude as water processing plant. It is a coincidence in the true sense of the word. The soil is clay soil and partially the limestone found on fields. Prior to planting, the plot was only used as grazing land for sheep. It originally possessed certain fertilizer matter and right next to the property line, there is a well with abundance of water.

The finely ploughed soil is located East to West, along all 80 (eighty) rows, organized into 10 (ten) planting fields found on both plots. Wooden pegs were positioned and plastic thread was spread between them. Right next to them, using special tools (metal spoons), small planting rows were drawn at a depth of between 4 and 6 cm. In each of the planting rows at a distance of between 10 and 11 cm, small holes were dug for the seed material (the cloves) and a lot of time was spent determining the precise distance. Only after they had been "carved out" did the planting fields get their desired form. The preparatory work, the planting on the soil of plot *"A"* 6 (six) and in plot *"B"* 4 (four), the border access paths and the empty space between the rows, created an ambient which lead to exaltation. The overall preparation for planting was quite timely, and no problems were encountered. When both plots had been prepared

professionally, and when planting could commence, three female workers were hired for the job, all of them with experience in growing garlic and other agricultural crops (raspberries, blackberries, fruit, vegetables, grain, aronia).

Identical technology of production was applied on both plots in question ("A" and "B"). While performing the experiment, special attention was given to determining production costs and to enforced agro-technical measures. Direct costing calculations for the chosen garlic types were compiled based on the experiment results and determined costs.

Planting procedure

Due to the desire for precision, preparations for planting were a very important operation. We made an effort to use many things from everyday life for different purposes. For example, apothecary scales were used for the precise measurement of the seed material (the cloves), measuring instruments which are used in technology, metal strips for measuring (length, width) and agricultural tools, the scales for measuring goods in bulk, timely transport of food for workers, etc. Measuring weight of up to 10 (ten) randomly selected bulbs of each type, in order to obtain their average weight, did not represent a problem. However, the separation and individual measuring of the cloves required a lot of precision. Material needed for the chemical protection of the seedlings and for fertilization during vegetation was prepared in a timely manner. Space meant for drying of garlic in wreaths, once it was extracted from the ground, was provided in airy locations under wooden beams into which, for this purpose, metal nails were inserted at equal intervals. The aim was to perform the exact same operations on both of the selected plots.

Proper selection of the type of seed material was of key importance for the final success of the production process. Based on the consulted literature (Nastovski at al., 2004), in the case of organic production of garlic, advantage is given to types/populations which are more adaptable to the local sub-climate conditions and which are resistant to harmful bio agents. Considering the fact it is recommended that the seed material originates from a certified organic production, there was no deviation from this rule, except for the use of seed material which originates from China. Thus, we made sure that the seed material originated from a competent supplier who raises his own high quality seed material and maintained it properly. For the purpose of this experiment 60 kg of seed material was procured, that is, cca 20 kg of each type of garlic, except for the *Zoza 51* type, which was already in stock. Thus, the prepared seed material consisted of four types of garlic: first the aforementioned undetermined type which originated from China purchased from a reputable dealer with a registered company, which we will refer to in this paper as *IQ 230 Tao*. Its bulbs, on average weighed a little over 31 gr, had on average 8 (eight) "tired" cloves with an average weight of approximately 3.5 gr with ruptured skin (the protective cover). The second type of seed material is *Bosut* type, produced at the Institute for Agriculture and Vegetable Production in Novi Sad, purchased in original packs of 5 kg each. Its bulb was of high quality, of a pronounced white colour, round, with an average weight of approximately 40 gr. It had on average, 10 (ten) cloves weighing approximately 4 gr each. The third type was *Zoza (51)* and was a local product from vicinity of Barakovac (Novi Pazar), brought in from the village of Horizare (Macedonia), nearly

13 years ago. Its bulbs on average, weighed in excess of 35 gr and consisted of a standard average of 9 (nine) reddish cloves with a tight protective skin. The fourth type was *Visoka* produced on one of the plots in the village of the same name, in the municipality of Arilje, at a farm of a reliable and well-known farmer. The average weight of the bulb did not exceed 30 gr and it had on average 9 (nine) small but firm cloves, each weighing a little over 3 gr.

The classified cloves were packaged into specially prepared cases so that they would not get mixed up before or during the planting. The seed material was completely dried, healthy and properly cleaned, so that each clove, which was very important, still had its skin (protective outer coating) which protected it in contact with the soil from damage and/or destruction. In plot *"A"* the planting was performed manually on October 8th, 2013 in Arilje, and on plot *"B"* Barakovac (Novi Pazar), also manually on October 9th, 2013. Placing the seed material into the prepared holes on both plots began at exactly 8 AM and took place in the following order:

- Rows I and V IQ 230 Tao,
- Rows II and VI Zoza (51),
- Rows III and VII Bosut, and
- Rows IV and VIII Visoka.

In each of the planting holes located in the rows, every clove was placed vertically, which was of special importance for the proper sprouting of young leaves and the formation of the future bulb. In the middle of the first field, on plot *"A",* that is, at 10.90 m, in the first 4 (four) rows of the first planting field, the cloves were deliberately turned upside down so that their growth could be monitored during vegetation; whether they would sprout at all and whether they would develop. The same was done on plot *"B"* but along a length of 16.35 m, also in the first 4 (four) rows of the first planting field. These locations in the first fields in all 4 (four) planted rows for both plots, was specially marked. Each planting hole in the row in which the cloves were planted was covered with a layer of soil approximately 2 to 3 cm thick, which is relevant for two reasons. First, if the clove were positioned any deeper into the ground, it could take longer time for it to sprout. Secondly, if it were positioned any lower and covered with soil, the root would develop with more intensity and spread outside the row onto the surface, which would usually result in its drying. The planting on both plots was completed in the same amount of time, between 4 to 5 hours of effective work. Upon completion of the planting, the wooden pegs and the thread were removed. Only one wooden peg was left in the places where the cloves had been planted upside down on purpose, so that they could easily be seen. After the planting of the seed material on both planting fields, appropriate protective measures against weeds and pests were taken, as the literature recommended and special efforts were made for their destruction.

Tables 1 and 2 show data on the characteristics of seed material for both plots, prior to and during the planting.

Table 1. Plot *"A"* - Arilje and the characteristics of planted seed material (in 2013)

Input	Types of garlic				Total
	IQ 230 Tao	Bosut	Zoza 51	Visoka	
Planting rows	12	12	12	12	48
Cloves planted in one row	218	218	218	218	
Bulbs planted in one row	24	22	24	23	93
Overall number of bulbs planted on the plot	288	264	288	276	1,116
Average number of cloves per bulb	9	10	9	9	
Average clove weight (gram)	3.5	4.0	3.6	3.2	
Average bulb weight (gram)	31.5	40.0	32.4	28.8	
Overall seed material per row (gram)	756	880	778	662	
Overall seed material for 12 rows (kg)	9.1	10.7	9.3	7.9	37

Source: According to fieldwork information.

Table 2. Plot *"B"* - Barakovac (Novi Pazar) and the characteristics of planted seed material (in 2013)

Input	Types of garlic				Total
	IQ 230 Tao	Bosut	Zoza 51	Visoka	
Planting rows	8	8	8	8	32
Cloves planted in one row	327	327	327	327	
Bulbs planted in one row	36	33	36	34	139
Overall number of bulbs planted on the plot	288	264	288	276	1,116
Average number of cloves per bulb	9	10	9	9	
Average clove weight (gram)	3.5	4.0	3.6	3.2	
Average bulb weight (gram)	31.5	40.0	32.4	28.8	
Overall seed material per row (gram)	907	1,056	933	788	
Overall seed material for 8 rows (kg)	9.1	10.7	9.3	7.9	37

Source: According to fieldwork information.

Results and discussion

Extraction of garlic starts when the tree and its leaves start changing colour from brown to yellow. But, the literature also warns that the occurrence of the yellow or brown colour does not only signal the onset of the extraction period, but also the occurrence of certain illnesses (McGee, 2004). In this case, the lack of green colour on leaves is a sign that the extraction process should begin, indicating that the plants were fully formed. We acted in accordance with the advice offered in the relevant literature, which promotes agro-technical measures and procedures (Trienekens, 2011). It said that the extraction should be done sooner rather than later, which has proven to be advantageous.

In addition to noting a change in colour during the first week of May, according to our assessment, over 60% of the garlic leaves on both plots were lying on the ground, which was also an indication that extraction should take place as soon as possible.

Just to be sure using a random sample technique, several bulbs were extracted from various rows of each type of garlic for experimental observation. It was determined that the external shape of the bulbs was well protected by bulging, tight skin and that the dimensions were well-formed and cloves were large and fully developed. The extraction and cleaning, based on the recommendations from the literature, were carried out in the morning hours first on plot *"A"* in Arilje on June 8th, and one day later on June 9th, 2014 on plot *"B"* Barakovac (Novi Pazar), which means that the garlic had spent full nine months in the ground.

Due to nice weather on both plots, we were able to apply the methods used in California, which are unique in the world, where the recently extracted bulbs are dried in the field itself (Agamalian and Kurtz, 1989), positioned along the rows for several days. Once they were extracted, they were typed out, collected and covered with a see-through tarp, and the excess leaves were removed so that they would not directly be exposed to the sun during the three-day drying period. The shape, colour and firmness of the bulbs indicated that they were healthy.

In both planting fields, in one case, protective measures from the mites and rot had to be performed (Martel and Cassidy, 2004). These were performed to a smaller extent primarily due to insufficient knowledge regarding the use of chemicals (pesticides). During the second week of March, the plants were fertilized using artificial means made of ammonium nitrate - AN with 12 kg per plot. None of the phases of the preparatory process were especially difficult, except for the constant kneeling when the cloves were being planted in the holes and then covered with dirt. That is the greatest problem in the case of growing garlic, and it seems to be a very important reason for larger planting fields to be avoided. New garlic was removed from the field by hand, and then the damaged or infected parts were removed. On some of the bulbs there were clumps of soil, especially from plot *"A"* in Arilje which had more clay soil. This led us to the question of whether or not the bulbs should be washed. The relevant literature also shows signs of a long-term controversy on whether freshly-extracted bulbs from the ground should be washed. Some claim that washing them is undesirable (Etoh, 1985), since it can lead to additional moisture which could cause the bulbs to decay. Others (Simon and Jenderek, 2003) think that washing the soil off the bulbs which were grown on softer" soil with enough humus is unnecessary, because they are easy to clean.

However, if garlic was grown on "heavier" soil, then its cleaning is more difficult and washing the bulbs with a stream of water from a garden hose is recommended. One should hold 5 to 6 bulbs in his hand and rotate them so that the water could wash off each side of the bulb. Once the dirt has been washed off the bulbs, they are usually stored on a dry surface (shelves or a tarp), so as to give them time to dry. If they are meant to be used as seed material, washing the soil off them is unnecessary since it dries off during time. It can be shaken off and it falls off by itself, leaving the bulb clean. In this case washing the bulbs was not necessary. The clumps of soil were easily removed, since during the three-day drying period they were able to fall off. In Tables 3 and 4 are shown the data on the results of growing garlic on both plots.

Table 3. Plot *"A"* - Arilje – total yield of garlic (in 2014)

Output	Types of garlic				Total
	IQ 230 Tao	Bosut	Zoza 51	Visoka	
Rows for extraction	12	12	12	12	48
The number of bulbs extracted from one row	189	193	191	193	
The average number of extracted bulbs per planting field	2,270	2,316	2,292	2,316	9,194
The average number of cloves per bulb	8	9	8	8	
The average weight of the cloves (gram)	3.6	4.2	3.8	3.5	
The average weight of one bulb (gram)	28.8	37.8	30.4	28.0	
The overall yield of new garlic per planting field (gr)	65,318	87,545	69,677	64,848	287,388
Overall yield – the extracted amount of garlic (kg)	65.3	87.6	69.7	64.8	287.4

Source: Data analysis according to fieldwork information/results.

Table 4. Plot *"B"* - Barakovac (Novi Pazar) – total yield of garlic (in 2014)

Output	Types of garlic				Total
	IQ 230 Tao	Bosut	Zoza 51	Visoka	
Rows for extraction	8	8	8	8	32
The number of bulbs extracted from one row	282	295	291	294	
The average number of extracted bulbs per planting field	2,256	2,360	2,328	2,352	9,296
The average number of cloves per bulb	8	9	8	8	
The average weight of the cloves (gram)	3.7	4.2	4.0	3.6	
The average weight of one bulb (gram)	29.6	37.8	32.0	28.8	
The overall yield of new garlic per planting field (gr)	66,778	89,208	74,500	67,738	298,224
Overall yield – the extracted amount of garlic (kg)	66.8	89.2	74.5	67.7	298.2

Source: Data analysis according to fieldwork information/results.

The measuring was first carried out on plot *"A"* in Arilje, based on the types of garlic, and it was determined that the smallest yield was noted for the Chinese type of *IQ 230 Tao,* which was not surprising based on the quality of the seed material. The highest yield on both plots was obtained for Bosut type, followed by type *Zoza 51*. *Visoka* type is the standard and showed better results than the Chinese type. On plot *"A"* in Arilje an overall yield of 287.4 kg was obtained, which is 7.8 times greater than the used 37 kg of seed material. On plot *"B"* in Barakovac (Novi Pazar) for the used 37 kg of seed material, a yield which was more than 8.1 times greater was obtained, 298.2 kg. The data in tables 5 and 6 show the relationship between the used seed material and the realized yield, determined through the measuring prior to forming the wreaths of garlic, that is, prior to drying.

Following the measuring, three female workers began making the wreaths and removing the excess leaves. One of the workers placed the wreaths on metal nails nailed into the wooden beams of both spaces, at a prescribed distance, so that the drying began in the draft under the same conditions. By putting garlic to dry, practical part of the experiment was over since all data for determining of costs and compiling of appropriate calculations were familiar. It was foreseen to sell the produced garlic locally, which meant no extra costs of transport or marketing.

Table 5. Plot *"A"* - Arilje – total yield and ratio between the planted and extracted quantities of garlic

Results	Types of garlic				Total
	IQ 230 Tao	Bosut	Zoza 51	Visoka	
Rows (planted-extracted)	12	12	12	12	48
Overall planted bulbs	288	264	288	276	1,116
Overall extracted bulbs	2,270	2,316	2,292	2,316	9,194
Extracted: planted bulbs	7.9 :1	8.8 : 1	8.0 : 1	8.4 : 1	8.2 : 1
Overall seed material (kg)	9.1	10.6	9.3	7.9	36.9
Overall yield (kg)	65.3	87.6	69.7	64.8	287.4
Overall yield: overall seed material	7.2 : 1	8.3 : 1	7.5 : 1	8.2 : 1	7.8 :1

Source: Data analysis according to fieldwork information/results.

Table 6. Plot *"B"* - Barakovac (Novi Pazar) - total yield and ratio between the planted and extracted quantities of garlic

Results	Types of garlic				Total
	IQ 230 Tao	Bosut	Zoza 51	Visoka	
Rows (planted-extracted)	8	8	8	8	32
Overall planted bulbs	288	264	288	276	1,116
Overall extracted bulbs	2,256	2,360	2,328	2,352	9,296
Extracted : planted bulbs	7.8 : 1	8.9 : 1	8.1 : 1	8.5 : 1	8.3 : 1
Overall seed material (kg)	9.1	10.6	9.3	7.8	36.9
Overall yield (kg)	66.8	89.2	74.5	67.7	298.2
Overall yield : overall seed material	7.3 : 1	8.4 : 1	8.0 : 1	8.7 : 1	8.1 : 1

Source: Data analysis according to fieldwork information/results.

In order to calculate economic result of growing garlic, analytic method based on direct costing calculation was used (Andrić, 1998, Gogić, 2009). This methodology is especially favourable for small households whose fixed and general costs are small or when their allocation to different products is complicated.

When calculating the value of production, one had to take into consideration an extremely complicated garlic market in Serbia which is a subject to strong seasonal and geographical fluctuations. Based on data from practice and depending on the aforementioned factors, we have come to a conclusion that the garlic from China costs from 100 RSD/kg to 150 RSD/kg, domestic garlic of an unknown type and of different quality costs from 150 RSD/kg to 250 RSD/kg, while a well-known and high quality garlic of "Bosut" type, costs from 250 RSD/kg to over 400 RSD/kg. During calculation of the value of production, out starting point was the average price of garlic of different origin of the seed material in Serbia and we have neglected the current prices of garlic at the locations of the experiment.

Another significant datum when calculating the value of production is weight loss of garlic during drying. Practice has shown that garlic loses 25-30% of its mass from the moment of being dried to the moment when it is ready to be sold. Assuming that not all quantity of garlic will be sold at that moment, more weight loss should be calculated in by the end of sale which amounts to 5-15%. Thus, garlic loses between 30% and 40% of its mass from the extraction

to sale providing that the sale does not last for too long.

Apart from direct costing calculations during production, there are also costs of the seed material, labour costs, fuel costs and costs of externally engaged machinery.

Considering that identical technology was applied in growing different types of garlic, the difference in obtained contribution margin comes from the price of the seed material and its quantity, as well as from the price and the quantity of obtained garlic.

Table 7. Direct costing calculation for two types of garlic

Description	Quantity		UM	Price per UM	Overall €			
	Plot "A"	Plot "B"			Plot "A"	Plot "B"	Plot "A"	Plot "B"
I. YIELD (after drying loses of 35%)			Kg	EUR	EUR	EUR	€/100m²	€/100m²
Bosut - planting area 80 m²	56.9	58.0	Kg	2.5	**142.4**	**145.0**	**177.9**	**181.2**
Visoka - planting area 80 m²	42.1	44.0	Kg	1.7	**71.6**	**74.8**	**89.5**	**93.5**
II. Variable costs – Bosut					**95.8**	**95.8**	**119.7**	**119.7**
II. Variable costs – Visoka					**74.1**	**74.1**	**92.7**	**92.7**
Seed material – Bosut	10.7	10.7	Kg	3.5	37.5	37.5	46.8	46.8
Seed material – Visoka	7.9	7.9	Kg	2.0	15.8	15.8	19.8	19.8
Fertilizer – AN	3.0	3.0	Kg	0.4	1.3	1.3	1.6	1.6
Fertilizer – manure	187.5	187.5	Kg	0.0	3.8	3.8	4.7	4.7
Soil preparation - ploughing and tiling	0.5	0.5	H	30.0	15.0	15.0	18.8	18.8
Planting the seed material	3.8	3.8	H	4.0	15.0	15.0	18.8	18.8
Weed removal and plant protection	1.3	1.3	H	4.0	5.0	5.0	6.3	6.3
Extraction and storage	2.3	2.3	H	4.0	9.0	9.0	11.3	11.3
Plastic thread	66.0	66.0	M	0.0	2.0	2.0	2.5	2.5
Plant protection - ridomil (R) MZ72/WP	0.5	0.5	Litter	1.2	0.6	0.6	0.8	0.8
Worker transport - fuel	5.0	5.0	Litter	1.4	6.8	6.8	8.4	8.4
III. Contribution margin (I-II) – Bosut					**46.6**	**49.2**	**58.2**	**61.5**
III. Contribution margin (I-II) - Visoka					**-2.5**	**0.7**	**-3.2**	**0.8**

Source: Author's calculation; *Note:* 1 EUR = 118 RSD.

Table 7 shows that according to the aforementioned technology of production and work organization, "Visoka" type gives poor economic results while contribution margin on plot "B" is barely positive, while plot "A" has negative value.

Production of "Bosut" type shows extremely positive contribution margin which resumed by square meter (100 m²), is around 60 EUR. Instead of hectare for the unit of area for which the contribution margin was calculated, we have taken 1are (100 m²) as the unit of area since this is the most frequently used unit with small individual farm producers.

Contribution margin value is more significantly influenced by the value of production than by the direct costing calculations which differ only in the value of cost for procuring the seed material. Significant difference in the value of production is being influenced by both the yield of "Bosut" type as well as the significantly higher price which can be achieved for garlic of this type, with regard to domestic and Chinese types.

Based on the obtained values for contribution margin of production of "Bosut" i "Visoka" garlic types, certain conclusions can be drown for the other two types from the experiment. Considering that the domestic unregistered type "Zoza 51" has shown similar yield values as well as "Visoka", all the aforementioned conclusions could be applied to this type, too. Chinese type of garlic cannot be recommended for growing, mostly because of low value in yield, where the contribution margin would be even more negative even if the same technology was applied.

Conclusion

The subject of this research was production and economic results of growing four different types of garlic on family households in Western Serbia. For this experiment, two plots in municipalities of Arilje and Novi Pazar had been chosen. Based on the result of production of determined costs of production, the direct costing calculation has been compiled for the chosen types.

The experiment under production conditions at the aforementioned locations included four types of "the fall" garlic abundant in Western Serbia, of whom one type is the registered type of "Bosut", two are domestic unregistered types but are abundant in the aforementioned municipalities. The forth type is an unknown type from China, chosen above all because of the growing abundance of it in Serbia.

The experiment started in October 2013 and finished in July 2014 (lasts for 9 months). After extracting the garlic was measured and stored.

Based on the achieved results, it can be concluded:

- Type "Bosut" achieved the highest yield on both plots (87.6 kg on plot "A" and 89.2 kg on plot "B"),
- Domestic unregistered type called "Zoza 51" was placed as second with 144.2 kg in total (69.7kg on plot "A" and 74.5kg on plot "B"),
- Chinese type called "IQ 230 Tao" has had the lowest yield in total 132.1 kg on both parcels, while the domestic unregistered type "Visoka" gained almost the same result with total yield of 132.5 kg.

Based on the production results from the experiment and determined costs, it was made the direct costing calculation for "Bosut" and "Visoka" types, which shows:

- For applied technology and production organization at two examined locations where was grown "Bosut" type of garlic, contribution margin is positive and amounts around 60 EUR/100m^2,
- Contribution margin for garlic type "Visoka" under the same conditions, is negative on location "A" and barely positive on location "B".

According to the obtained results from both the experiment of production and the calculation as well, one can conclude that is justifiable to grow "Bosut" type, under the aforementioned conditions, for both production and economic reasons. Production of other garlic types cannot be recommended under the same conditions.

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PROIZVODNE I EKONOMSKE SPECIFIČNOSTI UZGOJA RAZLIČITIH SORTI BELOG LUKA

Ibrahim Totić[3], Stevan Čanak[4]

Sažetak

Beli luk poseduje ogroman značaj kako za ljudsko zdravlje, tako i za kulinarstvo. Ovo je biljna kultura čija proizvodnja nikako ne ugrožava agro i eko-sistem, odnosno koja je od posebnog značaja u procesu proizvodnje organske hrane. S obzirom da se uzgoj belog luka zasniva na primeni agro-ekoloških i agro-ekonomskih principa, radom se daje opis toka procesa pripreme zemljišta za sadnju, tehnologija sadnje i primena neophodnih agro-tehnoloških mera. Takođe, dat je i prikaz osnovnih karakteristika sadnog materijala, kao i tehnologija vađenja i skladištenja belog luka. Predmet istraživanja je utvrđivanje prinosa kod različitih sorti belog luka gajenih na dve različite lokacije u Srbiji. Poret toga, rad ima za cilj da utvrdi troškove proizvodnje, i prikaže rezultate kalkulacija zasnovanih na varijabilnim troškovima, te da uporedi dobijene ekonomske rezultate u proizvodnji različitih sorti belog luka na malim porodičnim gazdinstvima.

Ključne reči: *beli luk, tehnologija proizvodnje, marža pokrića.*

3 Doc. dr Ibrahim Totić, Departman za ekonomske nauke, Državni univerzitet u Novom Pazaru, Vuka Karadžića nn, 36300 Novi Pazar, Srbija, Telefon: +381 20 31 77 52, E-mail: itotic@np.ac.rs

4 Dr Stevan Čanak, asistent, Departman za hemijsko-tehnološke nauke, Državni univerzitet u Novom Pazaru, Vuka Karadžića nn, 36300 Novi Pazar, Srbija, Telefon: +381 20 31 77 52, E-mail: scanak@np.ac.rs

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IMPORTANCE OF PUBLIC WAREHOUSE SYSTEM FOR FINANCING AGRIBUSINESS SECTOR[1]

Vladimir Zakić[2], Vlado Kovačević[3], Ivana Ivkov[4], Vera Mirović[5]

Summary

The aim of this study was to determine the economic viability of the use of warehouse receipts for the storage of wheat and corn, based on the analysis of trends in product prices, storage costs in public warehouses and interest rate of loans against warehouse receipts.

Agricultural producers are urged to sell grain at the harvest time when the price of agricultural products is usually lowest, mostly because of their needs for financial sources. Instead of selling products, farmers can store them in the public warehouses and use short-time financing by lending against warehouse receipt with usually lowest interest rate. In following months, farmers can sell products at higher price and repay short-term loan.

This study showed that strategy of using public warehouses and postponing the sale of grains after harvest is profitable strategy for agricultural producers.

Key words: *commodity exchange, public warehouse, warehouse receipt, short term loans.*

JEL: *Q13, Q14, G18*

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2 Vladimir Zakić, Ph.D., Assistant Professor, University of Belgrade – Faculty of Agriculture, Nemanjina Street no. 6, 11080 Zemun, Serbia, Phone: +381 63 313 234, E-mail: zakic@agrif.bg.ac.rs

3 Vlado Kovačević, Ph.D., Indemnity Fund of the Republic of Serbia, Nemanjina Street no. 22-26, 11000 Beograd, Serbia, Phone: +381 64 65 81 519, E-mail: vlado.kovacevic@kompenzacionifond.gov.rs

4 Ivana Ivkov, B.Sc., Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia, Nemanjina Street no. 22-26, 11000 Beograd, Serbia, Phone: +381 64 125 30 34, E-mail: ivana.ivkov@minpolj.gov.rs

5 Vera Mirović, M.Sc., Lecturer, Higher School of Professional Business Studies, Vladimira Perića Valtera Street no. 4, 21000 Novi Sad, Serbia, Phone: +381 21 485 40 00, E-mail: veramirovicns@gmail.com

Introduction

The case study on importance of public warehouse is done in Serbia, which established fully operational system with:

- Licensing of public warehouse.
- Special unit in the Ministry of Agriculture in charge of public warehouse inspection.
- Indemnity Fund in charge of compensation of grain owner/warehouse receipt holder in case of public warehouse failure.

Beside public warehouses, Serbia also has non-licensed warehouses for agricultural products and these two systems are functioning in parallel and can be compared (Stevanović et al., 2012). As grain prices in Serbia closely correlate with world grain prices, this study can be useful for neighbouring countries with sufficient grain production level, especially for Romania and Croatia, but also for all other countries with similar grain storage costs, interest rates and grain prices.[6] There are also some new approaches to crop insurance (before harvest) which are used in USA and Canada, such is index insurance. This group of insurance methods is interesting because it is based on the data related to a certain region or administrative unit, while most insurance systems are related to the results of the individual farms (Marković et al., 2013).

The most common questions in countries without public warehouses systems are the following: Do we need public warehouse system? Is it necessary to establish public warehouse system with all three components? Should the warehouse receipts system be embedded in the legislation or contractual relations between the interested parties are sufficient?

The experience of USA, Canada, majority of EU countries, Ukraine, Serbia etc. shows that fully functional warehouse receipts system is very beneficial for the agribusiness sector.

The warehouse receipts systems with all the supporting structures in place has been proven in practice to be more efficient compared with partly established systems (Munćan et al., 2011). If possible, countries opting for introduction of the system should have:

- **Licensing** body and licensing procedures for warehouses in order to obtain public warehouses license.
- Special **controlling** body in charge of controlling public warehouse.
- **Guarantee** structure (such as Indemnity Fund) needs to be established to reimburse the grain owners/warehouse receipts holder if public warehouse cannot deliver grain to the owner. It is important to have out-of-court procedure for compensation (Hollinger et al., 2009).

6 Romania has established system of public warehouses without Indemnity fond and system need to be further developed. Croatia is in the process of developing public warehouse system. Hungary has public warehouse system that doesn't make distinction between industrial and agricultural storage. Macedonia, BiH and Montenegro have no sufficient volume of grain productions and development of public warehouses could not be recommended.

If the system is not based on all three components, like it was in the case of Romania, players in the system will not have enough trust: when landing against warehouse receipts banks will be reluctant or interest rate will be higher, traders will have doubt that the grain will be delivered from warehouses and avoid trading with warehouse receipts etc. Development of warehouse receipts is also an essential base for futures and option markets, because warehouse receipts are needed for futures contracts delivery (Coulter and Onumah, 2002).

In Table 1 is shown difference between non-licensed storage which have operated for decades and new public warehouses.

Table 1. Comparative analysis of public warehouses and common non-licensed warehouses

Indicator	Common warehouse	Public warehouse
Insurance of stored agricultural product	Not required	Obligatory
License for operation	Not required	Obligatory
Compensation of funds in the case of goods cannot be taken from warehouse	None	Indemnity fund
Products that can be stored	All types of industrial and agricultural products	Certain types of agricultural products
System of warehouse monitoring	None	Special inspection service

Source: Authors' opinion.

There were several attempts to create private public warehouse systems, like in Russia, Kazakhstan, Turkey, mostly from banks and commodity exchanges, but without success (Belozertsov et al., 2011). Recommendation can be given that public warehouse system is needed to be established through national legislation, while licensing and controlling function has to be done by government.

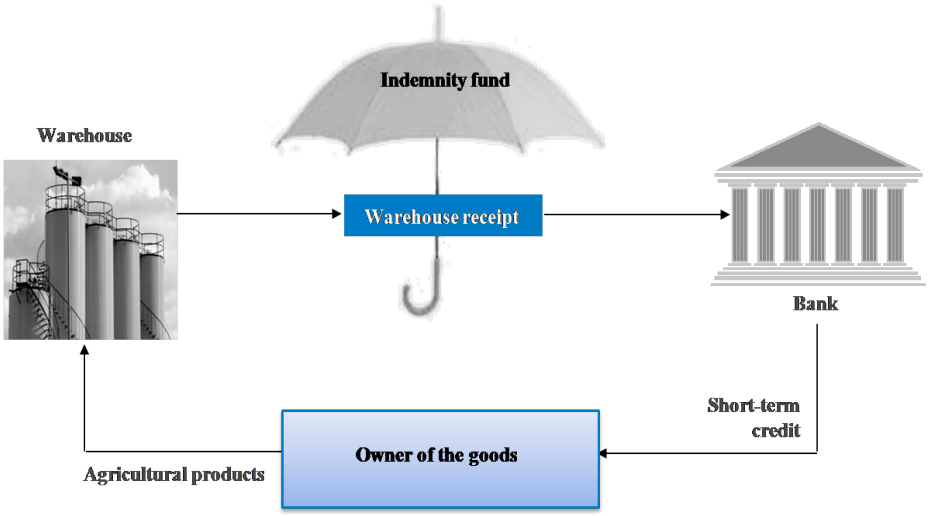
The benefits of the use of warehouse receipts for agricultural sector

The public warehouse system is based on the licensing of warehouses for grains and oilseeds. To obtain a license, a warehouse must meet the requirements in terms of equipment and facilities and show positive business performance in the previous accounting period, including a sufficient level of a free capital. A public warehouse may issue a warehouse receipt for its own stored goods or for the goods of a third party, as proof of storage[7].

The warehouse receipt can be used as collateral (Vasiljević and Zakić, 2006) for obtaining short-term loans, which typically have a lower interest rate compared to other short-term loans (Scheme 1). The warehouse receipt can be sold and will typically generate higher prices than the same product sold with other proof of storage (Back et al., 2013).

7 In many warehouse systems, public warehouses are prohibited of issuing warehouse receipts for their own goods. Serbia is allowing this action and this can be recommended for all other systems.

Scheme 1. Model of lending against warehouse receipt



Source: Indemnity Fund of the Republic of Serbia.

Besides being the collateral for obtaining traditional short-term loans, warehouse receipt could also be used for repurchase agreement. Repurchase agreement is an agreement on the sale of securities with a commitment to repurchase them at a specified period and at a fixed price (Mirović and Bolesnikov, 2013). The seller of warehouse receipt (farmer) agrees to repurchase them from the buyer (bank) in predefined period and price.

The benefits of warehouse receipts such as a better price for goods stored in a public warehouse and the acceptance as collateral by commercial banks are the result of the confidence that banks and traders have in the system (Kannapiran, 2000). This confidence is derived form so-called "three rounds of safety" that are built into the system:

1. Only a first class warehouse with appropriate financial indicators and equipment can be licensed.
2. A special inspection service within the Ministry of Agriculture monitors the goods stored in public warehouses.
3. Indemnity Fund which, in the event that the owner of the goods cannot get the products from the public warehouse, indemnify the owner within five days through an out-of-court procedure.

One of the milestones of the public warehouse system is the fact that the Indemnity Fund has separate funds intended for compensation to owners of different types of products.

After establishment of public warehouse system, it is important to have close cooperation with the National bank. In Serbian example, the National Bank of Serbia (NBS) has designated a "sufficient credit rating" for loans against warehouse receipts. This decision has had two effects. Firstly, when lending against warehouse receipts, banks must pay only a 5% deposit

to NBS. Secondly, the NBS' decision sent a signal to commercial banks that the warehouse receipt is a first-class commodity security.

Subsidies aimed at reducing interest rates for loan against warehouse receipts are also important element, especially during the first years of the establishment of the system (Vasiljevic and Zakic, 2006). This approach could help banks to gain confidence in warehouse receipts as collateral. EBRD supported three banks in Serbia for loans against warehouse receipts with 50,000,000 EUR throughout risk-share program. Subsidies of storage costs in the public warehouses, especially in the beginning phase, are another important element of support. Based on the Serbian and Bulgarian experience, subsidies have to be higher for the better quality products.

The practice in most countries with public warehouses is to introduce a system of subsidies for storage costs that would support the development of the system in the first few years. In addition, the issue of public warehouses and warehouse receipts are of national importance for the storage of strategic commodity reserves, especially for corn and wheat. In that sense, the following two measures could be recommended for further development of public warehouses: (1) subsidies to storage costs in public warehouses; (2) subsidies to grading equipment needed for grain classification.

Such subsidies would help generate additional interest of new participants and further develop the system (Tilton, 2010). Furthermore, by subsidizing storage in public warehouses in such a way that higher quality products are favoured with higher subsidies, farmers would have an additional interest in producing higher quality goods. Subsidizing equipment for rapid measurement of the protein level in wheat would allow quality classification of wheat. As in other transition countries, it is expected that these two measures could provide an indirect positive effect on improving the quality of wheat (Roache, 2008). That is primarily because producers will be able to sort wheat, to receive higher subsidies for better quality and a better price for their product (Zakić and Kovačević, 2012). Until now, the quality of wheat has not been determined and farmers have usually been paid on the basis of visual characteristics of their wheat, so there has been no economic interest to invest in quality that could not be determined and paid.

It is recommended to develop an electronic warehouse system. Most EU countries are using warehouse receipts in paper form. Advantages of electronic warehouse receipts vs. paper warehouse receipts are:

- Electronic system is safer because public warehouse will be allowed to issue warehouse receipts up to the licensed capacity (electronic system will stop issuing the warehouse receipt for any quantity over the licensed capacity), while in paper form public warehouse can issue warehouse receipts in quantity greater than the licensed capacity. In this manner, the electronic system would increase the overall safety and the lower amount of funds in the Indemnity Fund would be necessary.
- Banks will be allowed to enter in the electronic warehouse system and put the collateral on warehouse when lending against warehouse receipt. Procedure for banks are less

time consuming (for receipts in paper form banks need to send query to warehouse by fax and when the collateral is established, again need to send fax to warehouse to inform that collateral is established on warehouse receipt etc.) and more secure which leads to lower interest rates.

- Commodity exchanges will have direct links and trading orders could be sent in electronic form. Paper warehouse receipts need to be sent to the commodity exchange by mail. Trading order in case of electronic warehouse receipts can be submitted with local brokerage firms.
- There is no need for public warehouse to purchase costly blank paper warehouses receipts and dairies for keeping public warehouse receipts records, so the overall system would be less expensive.

Methodology and data sources

Based on the nature of the research, authors used different scientific methods applied in the social sciences: case study approach (using examples), method of interview with relevant experts in the field of establishing public warehouse system, statistical methods in analyzing the collected data received from Commodity exchange Novi Sad (grain prices in Serbia closely correlate with world grain prices).

Econometrical model

In this article, cost-effectiveness of the use of warehouse receipts is made for wheat and corn. Analysis is based on two scenarios. Under the first scenario, an agricultural product is sold immediately after harvest when the prices are typically lowest. This is compared to scenario two when the agricultural product is stored in the public warehouse and sold later in the year when the price is higher. Wheat is analyzed in the period from July to June the following year, while maize covers the period from October to September.

The following parameters are used in the analysis:

$$K = \frac{((P_{2008} - C_{2008}) + (P_{2009} - C_{2009}) + (P_{2010} - C_{2010}) + (P_{2011} - C_{2011}) + (Pm_{2012} - Cm_{2012}))/Y}{Ps}$$

$$C = (V*(I + S)) * N$$

K – Coefficient of profitability of storing products, calculated for each month.

C – Cost of grain storage and interest rate on loan in euros/t, calculated for each month.

V – Product' value in euros/t.

S – Storage costs. In the Serbian practice, storage services are paid at the time of taking goods from the warehouse and calculated as 1% of value of goods /monthly (storage cost calculation is based just on specific market price in the month when goods are taken from the warehouse).

N – Number of months that the grain is stored.

Y – Number of year in observed period.

P – Price at the specific month of sale.

Ps – Average price for observed period at the harvest month (for wheat it is July, for corn it is October).

$$I = Iw*T + Io*(1-T)$$

I – Average interest rate.

Iw – Loan interest rate against warehouse receipt is calculated on the basis of 0.38% (simple) interest rate per month.[8]

T – Percentage of current warehouse receipt' grain value for which banks are approving loan – calculated on the basis of 70%.[9]

Io – Loan interest rate on sum which is not covered from loan against warehouse receipt. In order to get financed on full sum that can be received by selling at the harvest time. According to this calculation 30% of that sum needs to be financed throughout regular loans. Interest rate is calculated on the basis of 0.65% (simple) interest rate per month.[10]

According to calculation, average interest rate (I) used in the calculation is 0.46% (simple) interest rate per month

Coefficient of profitability of storing products (K) shows the relation between prices of grain within 5 years period deduct by cost of storage and interest rates for each month and average grain price at the harvest time. K coefficient has to have value more than one in order to recommend storage instead of sale at harvest time. If this coefficient is less than 1, than storage can not be recommended because it will bring losses. Percentage of profit or loss (R) in performing the strategy of storing the agricultural product in public warehouse and financing by use warehouse receipts as collateral for short term loan, instead of selling product at harvest time can be calculated:

$$R = (K - 1) * 100\%$$

Empirical study: cost-benefit analysis of the use of warehouse receipts for wheat

The average monthly prices of wheat for the period 2007-2012 are given in Table 2. In 2007/2008 the price of wheat successively grew slowly until the next harvest.

8 Authors estimation based on consultations with commercial banks.

9 Authors estimation based on consultations with commercial banks.

10 Authors estimation based on consultations with commercial banks.

Table 2. Average monthly wheat price (EUR/t)

Month	Average monthly wheat price (EUR/t)				
	2007/08	2008/09	2009/10	2010/11	2011/12
VII	165.66	195.72	99.94	127.18	169.60
VIII	181.14	189.31	96.50	163.74	170.70
IX	195.17	174.52	95.15	174.71	173.07
X	236.67	163.14	93.11	182.45	175.55
XI	221.88	145.43	116.61	206.73	174.18
XII	242.90	133.22	119.72	234.89	178.52
I	237.86	122.21	115.27	245.11	193.75
II	273.81	128.57	112.91	271.06	200.66
III	274.05	117.12	110.36	304.94	197.46
IV	283.48	106.15	106.78	296.10	193.22
V	260.27	125.56	102.21	271.19	190.89
VI	244.04	132.07	102.71	234.33	201.52

Source: Authors' calculation based on Weighted average, monthly price reports for corn and wheat for period 2007-2012., Commodity Exchange Novi Sad, data received upon request.

In July of 2008/2009 the wheat reached a maximum harvest price of 195.72 EUR/t. In 2009/2010 the lowest price of 99. 94 EUR/t was recorded. During 2009/2010 the prices are at the lowest level of the analyzed period, but at the same time relatively stable. In August 2010/2011 wheat reaches a price that is higher by about 23% compared to the previous month. In March 2010/2011 the price of wheat is the highest in the analysed period.

Table 3. Cost-benefit analysis of the use of warehouse receipts for wheat in the period from 2007-2012

Month	Financial result (EUR/t)						
	2007/08	2008/09	2009/10	2010/11	2011/12	K	R (%)
VII	-	-	-	-	-	1.00	-
VIII	12.91	-9.20	-4.86	34.34	-1.39	1.04	4
IX	24.08	-26.49	-7.61	42.87	-1.55	1.04	4
X	61.62	-40.18	-11.00	48.04	-1.66	1.07	7
XI	44.30	-59.71	10.17	68.94	-5.51	1.08	8
XII	61.28	-73.66	11.50	93.04	-3.91	1.12	12
I	53.36	-86.24	5.66	99.71	7.84	1.11	11
II	83.65	-82.45	1.85	120.81	11.55	1.18	18
III	80.37	-95.17	-2.09	148.68	5.82	1.18	18
IV	85.45	-107.23	-6.91	137.01	-0.79	1.14	14
V	60.96	-91.72	-12.55	111.04	-5.60	1.07	7
VI	43.15	-88.08	-13.59	74.94	1.17	1.02	2

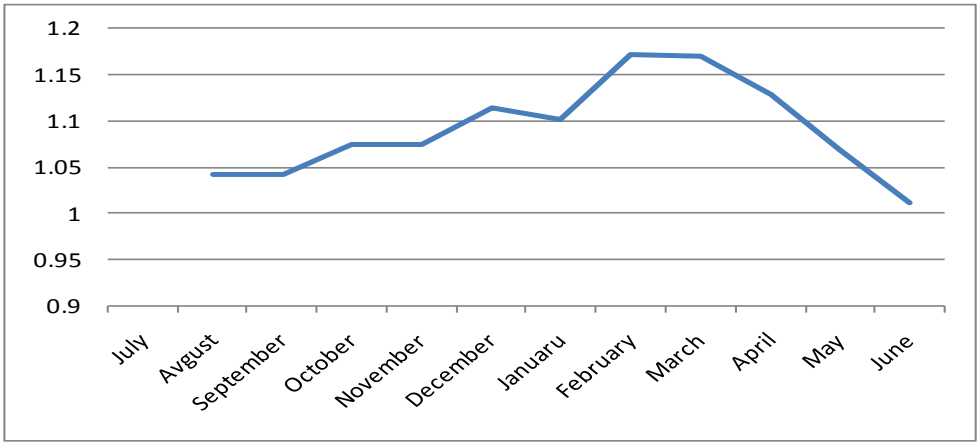
Source: Authors' calculation based on Weighted average, monthly price reports for corn and wheat for period 2007-2012., Commodity Exchange Novi Sad, data received upon request.

According to the Table 3, the use of strategy of storing the agricultural product in public warehouse and financing by the use of warehouse receipts as collateral for short term loan, instead of selling product at harvest time, performed positive financial results for agricultural

producers. Next step in this study is to analyze specific results of postponing the sale by each month for the observed period of 2007/2008, 2008/2009, 2009/2010, 2011/2012:

1. **August sale** will bring better wheat price for producers. R percentage for this month is 4% (or K coefficient 1.04) which means that the profit will be increased compared to sale at harvest. This is one of the months with lowest K coefficient, therefore cannot be recommended for product sale. This is expectable because in the first month after harvest there is sufficient supply of wheat and prices are slowly rising.
2. **September** will bring better wheat price for producers (same results as the previous month), but R percentage for this month is still 4%. This is also one of the months with lowest R percentage, therefore product sale can not be recommended.
3. **October** has R percentage of 7% which mean that the profit will be increased compared to sale at harvest. The R percentage is still moderate, therefore product sale can not be recommended.
4. **November** has R percentage of 8% (similar as the previous month).
5. **December has** R percentage of 12%, because demand for wheat start to grow. R percentage is higher than before and sale in December can be considered.
6. **January has** R percentage of 11% - slightly lower than in the previous month. Sale should be postponed.
7. **February** has R percentage of 18% - that is one of two ***best months*** for sale and paying of loan against warehouse receipt. Sale in February is highly recommended.
8. **March** has R percentage equal with previous month. Sale is highly recommended.
9. **April** has R percentage of 14%. Sale in April can be recommended, as a third best month for sale.
10. **May** has R percentage of 7%, therefore product sale can not be recommended.
11. **June** has R by percentage of 2%, therefore product sale also can not be recommended.

Figure 1. K - coefficient for wheat in the period of 2007/2012



Source: Authors' calculation based on Weighted average, monthly price reports for corn and wheat for period 2007-2012., Commodity Exchange Novi Sad, data received upon request.

Empirical study: cost-benefit analysis of the use of warehouse receipts for corn

Average monthly prices for corn in the period of 2007-2012 are given in Table 4. During the reporting period, there were very different movements in the monthly price of corn. Corn prices harvested in 2008 at the harvest reached a maximum of 219.99 EUR/t. During this economic year, the variability in prices did not exceed 6% from the average until August, when prices fell sharply by about 30% compared to the previous month.

Table 4. Average monthly price of corn (EUR/t)

Month	Average monthly corn price (EUR/t)				
	2007/08	2008/09	2009/10	2010/11	2011/12
X	219.99	89.84	89.47	145.31	151.76
XI	183.45	82.62	103.84	151.22	148.79
XII	192.62	84.00	105.33	174.51	144.88
I	194.29	90.12	111.82	202.76	160.00
II	182.65	96.80	110.10	200.92	167.90
III	176.70	88.00	108.06	211.50	168.10
IV	187.38	95.76	116.55	211.58	174.68
V	181.92	114.36	116.32	201.69	171.34
VI	189.87	125.35	129.06	197.44	169.57
VII	185.69	118.08	158.62	219.63	209.42
VIII	133.83	98.97	178.78	195.01	218.49
IX	114.58	83.22	169.81	166.45	232.98

Source: Authors' calculation based on Weighted average, monthly price reports for corn and wheat for period 2007-2012., Commodity Exchange Novi Sad, data received upon request.

Profitability of the use of warehouse receipts in the period from 2007-2012 is shown in Table 5.

Table 5. Cost-benefit analysis of use of warehouse receipts for corn in the period from 2007-2012

Month	Financial result (EUR/t)						
	2007/08	2008/09	2009/10	2010/11	2011/12	K	R (%)
X	-	-	-	-	-	1.00	-
XI	-39.39	-8.46	12.92	3.73	-5.16	0.95	-5
XII	-33.25	-8.35	12.93	24.37	-11.17	0.98	-2
I	-34.56	-3.66	17.76	49.36	1.35	1.04	4
II	-48.69	1.43	14.58	44.90	6.63	1.03	3
III	-57.18	-8.31	11.13	52.27	4.44	1.00	-
IV	-49.92	-2.31	17.62	49.56	8.25	1.03	3
V	-57.89	13.62	15.83	37.58	2.70	1.02	2
VI	-53.41	22.18	25.97	30.99	-1.34	1.04	4
VII	-60.12	13.89	51.17	48.54	32.53	1.12	12
VIII	-10.66	-4.90	67.32	23.51	37.90	1.02	2
IX	-129.15	-20.32	57.13	-4.52	47.91	0.93	-7

Source: Authors' calculation based on Weighted average, monthly price reports for corn and wheat for period 2007-2012., Commodity Exchange Novi Sad, data received upon request.

The periods 2009/2010, 2010/2011 and 2011/2012 were typical in which the price of corn rose from the beginning of the new harvest. In these years, the use of commodity securities brought high additional profits.

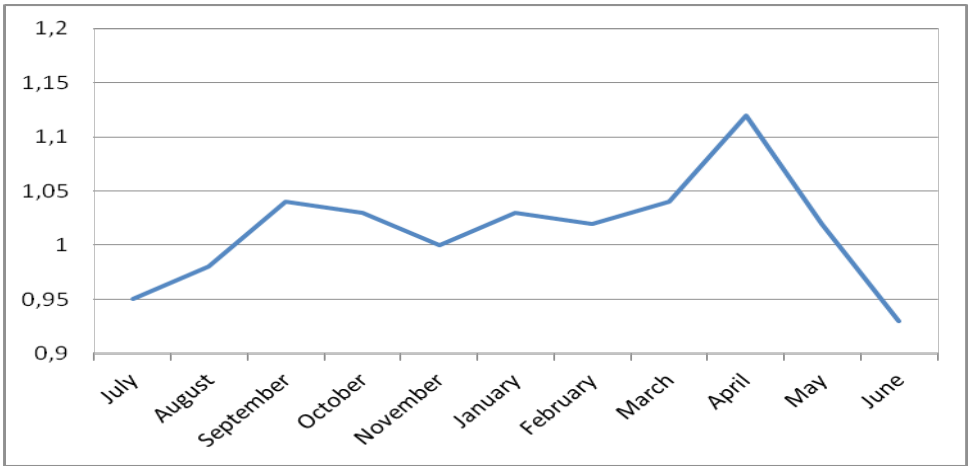
According to the Table 5, the use of strategy of storing the agricultural product in public warehouse and financing by use warehouse receipts as collateral for short term loan, could give positive results for agricultural producers in certain months. Like in previous case of wheat, next step is to analyze specific results of postponing the sale by each month for the observed period of 2007/2008, 2008/2009, 2009/2010, 2011/2012:

1. **November** is month when the sale of corn will bring loss. R percentage for this month is -5%. This is expectable because in the first month after harvest there is sufficient supply of corn. Sale can not be recommended.
2. **December** will bring better corn price for producers, but R percentage is still negative (-2%). Therefore, product sale can not be recommended.
3. **January** has R percentage of 4%. Sale can be recommended in this period, especially when compared with trends in following months.
4. **February** has R percentage of 3% (similar as previous month). Sale can also be recommended in this period.
5. **March** has barely positive R percentage (K coefficient is 1.0034). Sale can not be recommended.

6. **April** has R percentage of 3% and the corn prices are still rising. Sale in April can also be recommended.
7. **May** has R percentage slightly lower than in the previous month (2%). Sale in May can not be recommended.
8. **June** has R percentage of 4%, but sale should be postponed for July.
9. **July** is the ***best month*** for corn sale and paying of a loan against the warehouse receipt. R percentage is highest (12%). Sale is highly recommended. Since the average price is dropping producers should not to wait any longer.
10. **August** has R percentage of 2%. This is final period for any positive result.
11. **September** is the worst month for producers. R percentage is -7%.

Figure 2 graphically shows K coefficient trends for corn for observed average period of one economic year.

Figure 2. K - coefficient for corn in the period of 2007/2012



Source: Authors' calculation based on Weighted average, monthly price reports for corn and wheat for period 2007-2012., Commodity Exchange Novi Sad, data received upon request.

Conclusion

On the basis of this research, the conclusions can be drawn that strategy of using public warehouses and postponing the sale of grains after harvest is profitable strategy for agricultural producers.

By postponing the wheat sale farmers could increase profit by 2-18%. Best months for wheat sale and paying back the loans against warehouse receipts are February and March. It could be concluded that strategies of using warehouse receipts for financing generates much better results for wheat compared to corn.

By postponing the corn sale farmers could increase profit up to 12%, but sale in the months

close to new harvest can generate loss up to 7%. A best month for wheat sale and paying back the loans against warehouse receipts is July.

Finally, the research results point out the great significance of public warehouse system for financing agriculture. For development or improvements of the existing public warehouse system, several recommendations could be given:

1. Establishment of public warehouse with all three components: licensing procedures, inspection body and indemnity fund.
2. Development of public warehouse system just for agricultural products. Public warehouse system for industrial products has to be established separately.
3. System has to be based on legislation rather than the private contracts among the parties in the system.
4. It is important when developing system to cooperate with National bank in order to provide best credit rating for loans against warehouse receipts.
5. It is of great importance to introduce electronic warehouse receipts.
6. Practice in the most countries with a public warehouse system is to introduce a system of subsidies that would support the development of the system in the first few years.

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ZNAČAJ SISTEMA JAVNIH SKLADIŠTA ZA FINANSIRANJE AGRO-BIZNIS SEKTORA

Vladimir Zakić[11], Vlado Kovačević[12], Ivana Ivkov[13], Vera Mirović[14]

Rezime

Cilj ovog rada je da se utvrdi ekonomska isplatljivost korišćenja javnih skladišta za skladištenje pšenice i kukuruza na osnovu analize kretanja cena proizvoda, troškova skladištenja i kamatne stope na kredite koji kao zalogu imaju robni zapis.

Poljoprivredni proizvođači su usled potreba za finansijskim sredstvima često primorani da prodaju žitarice odmah nakon žetve kada je cena po pravilu najniža. Umesto prodaje, poljoprivrednici mogu uskladištiti proizvod u javnim skladištima i koristiti robni zapis kao obezbeđenje za kratkoročni kredit koji često ima nisku kamatnu stopu. U mesecima nakon žetve poljoprivrednik prodaje robu po višoj ceni i vraća kredit.

Ovaj rad je ukazao na profitabilnost strategije skladištenja robe u javim skladištima i odlaganje prodaje proizvoda za period nakon žetve.

Ključne reči: *robna berza, javno skladište, robni zapis, kratkoročni kredit*

11 Doc. dr Vladimir Zakić, Univerzitet u Beogradu - Poljoprivredni fakultet, Nemanjina 6, 11080 Zemun, Srbija, Telefon: +381 63 313 234, E-mail: zakic@agrif.bg.ac.rs

12 Dr Vlado Kovačević, Kompenzacioni fond Republike Srbije, Nemanjina 22-26, 11000 Beograd, Srbija, Telefon: +381 64 65 81 519, E-mail: vlado.kovacevic@kompenzacionifond.gov.rs

13 Ivana Ivkov, dipl. inž., Ministarstvo poljoprivrede i zaštite životne sredine Republike Srbije, Nemanjina 22-26, 11000 Beograd, Srbija, Telefon: +381 64 125 30 34, E-mail: ivana.ivkov@minpolj.gov.rs

14 Mr Vera Mirović, predavač, Visoka poslovna škola strukovnih studija, Vladimira Perića Valtera 4, 21000 Novi Sad, Srbija, Telefon: +381 21 485 4000, E-mail: veramirovicns@gmail.com

Review Article

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THE IMPORTANCE OF ECONOMIC STRUCTURE EVOLUTION IN ACHIEVING PERFORMANCE - FROM AGRARIAN ECONOMY TO COMPETITIVENESS IN ROMANIAN ECONOMY[1]

Jean Vasile Andrei[2], Adrian Ungureanu[3]

Summary

In terms of more increased integration and globalization of markets, risk diversification and exposure to external economic factors disturbing the structure of the national economy acquires a major role in alleviating and absorbing adverse effects on national economies are exposed. Starting from the reality that reducing disparities and achieving convergence criteria cannot be achieved except through the perspective of economic structures, the main objective of this research is the analysis of the importance of the economic structure in achieving functional requirements and competitive market economy, in the process of transition agrarian economy to a market economy in Romania, highlighting the main changes and effects that occurred in the past twenty-three years in the national economy, with a closer approach on agricultural structures.

Key words: *agriculture, competitiveness, GDP, economic structure, inland economy.*

JEL: *A12, Q10, M20*

Introduction

Making functioning and highly competitive market economy in Romania is a major goal of a period marked by strong and sharp economic imbalances. The evolution of the national economy largely reflected the effects of a long process of reform and economic restructuring which had the main objective of making a strong centralized socialist economy to a market economy that works on the principles of economic democracy, being equally

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2 Andrei Jean Vasile, Ph.D., Assistant, Petroleum-Gas University of Ploiesti, Faculty of Economic Sciences, B-dul Bucuresti no. 39, 100680 Ploiesi, Prahova, Romania, Phone: +40 721 146 587, E-mail: ajvasile@upg-ploiesti.ro

3 Ungureanu Adrian, Ph.D., Lecturer, Petroleum-Gas University of Ploiesti, Faculty of Economic Sciences, B-dul Bucuresti no. 39, 100680 Ploiesi, Prahova, Romania, Phone: +40 723 561 211, E-mail: ungureanu_adrian2001@yahoo.com.

a sounding board for the frequent and sometimes very disarticulated reform measures that have contributed mostly to the economic environment-enhancing and rather more stressed economic imbalances. From this perspective, agriculture continued to play an important role in the national economy, becoming, as remarked in some specialized studies (Karp and Stefanou, 1993; Abele and Frohberg, 2003; Swinnen and Ciaian, 2008), net safety for a population with strong accents of rurality.

The findings of the literature confirm once again the difficulties in achieving the necessary conditions of a market economy. Thus Petrescu (2013) noted that "after 1990, the agricultural sector has encountered a sinuous phase of redefining and re-positing the national economy, the reality of the socialist period was decomposed to make room for new coordinates" (Petrescu, 2013, p. 36).

Although during the fourteen years of continuous transition Romania succeeded, after a period of more than seventeen years, to integrate into the European economic and social space, there are still imbalances in the national economy and the economic performance is modest. From a sectorial perspective, agriculture, although significantly reduced its contribution to GDP (Global Domestic Product), continued to influence significantly the macroeconomic results as it was remarked in some studies as (Ciutacu et al., 2014; Tegledi, 2011; Done et al., 2012).

In achieving the objectives, the present paper is structured on two major dimensions for understanding the transformations that marked the national economy in the shift of achieving the criteria of a functioning market economy. Thus in the first part of the paper we analyse the evolution of global GDP and GVA (Gross Value Added), but also in terms of structure, on the other hand is trying to explain some of the factors that accentuate the gaps between national and European space economy, trying to offer some explanations in this respect.

Regarding the importance of agriculture in the national economy were conducted numerous studies and most of them reveal the need for analysis and understanding of the role and impact that this economic sector owns both transition economies and in terms of alleviating the economic crisis. Such as notice (Dachin, 2011) agriculture, for some European countries is considered an industry, after a long process of grant and redistribution of public financial resources, which have direct and immediate effect a sustained increase in economic performance, becoming the highest competitive. On the other hand (Dropu, 2007) provides an image of Romanian agriculture, torn by the ancestral desire of land ownership and stubbornness of peasants to keep their identity, sometimes synonymous with love of land.

As it has been already observed (Andrei and Gheorghe, 2014; Done et al., 2012), agriculture is a branch with important significance to the national economy by mobilizing resources that it has and the major role it holds in the rural communities, for which it often constitutes the only branch of activity. Achieving an efficient economy in Romania depends on the way the national economic structures adapt to the demands for performance required by the operation of a competitive market economy, in the context of convergence with the European space.

The high degree of ruralisation of the national economy can be an obstacle in compliance with the application requirements of European cultural and economic model, to which most we often try to relate. The gaps that still persist towards the European economic model, at least from the perspective of achieving a competitive agriculture, can represent starting points for increasing competitiveness by enhancing restructuring.

The evolution of gross domestic product as effect of economic structures development

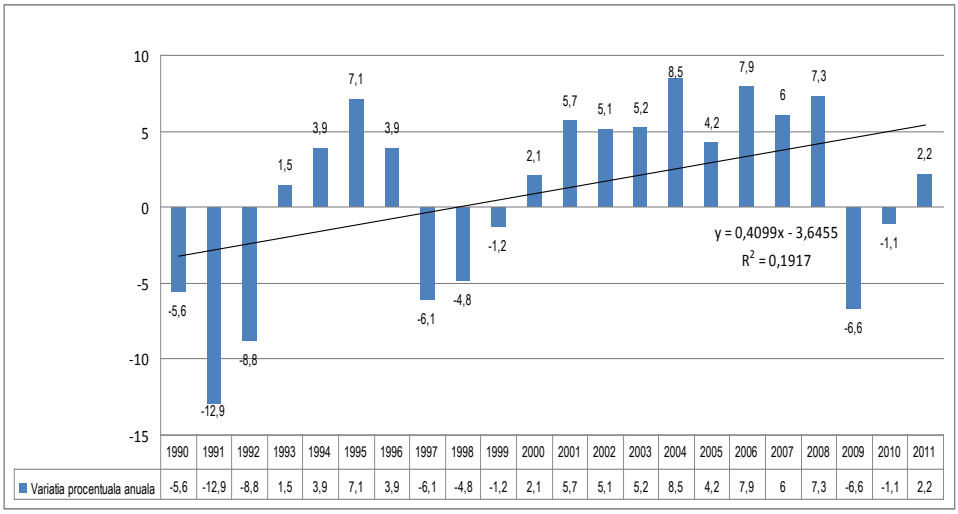
Analyzing the Gross Domestic Product (GDP) evolution as a direct effect of of the economic structures development and restructuration represents a major challenge in case of a transitional economy as Romania economy is. For achieving responsible and predictive results the analysis was based starting from some literature studies as (Andrei et al., 2014; Zaharia and Zaharia, 2013; Done et al., 2012; Andrei and Untaru, 2012; Gheorghe, 2014; Arcand and Borodak, 2011).

In order to carrying out the research it was used mainly the official statists datasets from INS (2014a), INS (2014b), INS (2012) and INS (2008).

In modern economies knowing the level of macroeconomic outcome is not only an obligation for decision makers, but it especially requires choosing the most effective methods in construction, management and allocation of public funds towards those sectors that generate high added value. In this context the Gross Domestic Product (GDP) is one of the most used indicators for measuring macroeconomic results, although in the specialty literature there are increasingly highlighted the weaknesses and vulnerabilities in its measurement. At least in the case of Romania, the dimension of GDP is the subject of extensive discussion regarding sampling and margin of error in measuring this indicator. The GDP structure to achieve the highest level identify those sectors with functional and appropriate degree of competitiveness in the national economy.

Thus, if at the beginning of the transition period in Romania, in 1990, GDP was 857.9 billion lei nominal value, seventeen years later, in 2007, the year of integration of the national economy in the European Union, it reached a nominal value of 404.7 billion, which represented in terms of real calculation a growth of only 6.0% over the previous year, 2006. But analyzing annual variations in real GDP in Romania for the period 1990-2011, it can found that for twelve years it has recorded positive growth rates, from a low of 1.5% (1993), to a maximum of 8.5% (in 2004). In other years of the transition period, the annual percentage variation was negative, ranging from a low of -12.9% (in 1991) to a value of - 1.2% in 1999. In Figure 1 it is showed the evolution of real GDP during 1990-2011.

Figure 1. The evolution of real GDP in the period 1990-2011 (previous year = 100%)



Source: authors` own computation based on INS (2012)

As it can be seen from the data presented in Figure 1, over the period 1990-2011 it can identify three major cycles of the evolution of real GDP, with their corresponding phases. Also as it is already remarked in literature (Anghelache, 2013; Ciutacu and Chivu, 2009a; INS, 2008; Dobrota, 1999), the first economic cycle (1990-1996) is shorter than the second (1997-2008). It can be said that over the period of analysis, the first cycle of transition to a functional market economy, in terms of the evolution of real GDP, had a period of seven years with a downward phase of three years (1990 -1992) and an upturn for four years (1993-1996) and the second cycle has twelve years all started with three consecutive years of economic decline (1997-1999), followed by a phase upward of nine years (2000-2008). The third cycle corresponds to the period of economic crisis and it is characterized by two consecutive years of decline (-6.6 in 2009 and -1.1 in 2010), followed by a slight recovery in 2011 when it recorded an increase of 2.2 % in real terms (INS, 2014a). Table 1 presents the evolution of economic sectors contribution to gross domestic product in the period 1995-2012.

Table 1. The importance of economic sectors to GDP in Romania, 1995-2012 (% in GDP)

Activities	1995	2000	2005	2010	2011	2012
Agriculture, forestry and fishing	17.97	10.83	8.41	5.70	6.52	4.88
Industry	30.00	24.87	24.81	28.37	28.82	28.25
Construction	6.28	5.16	6.89	9.12	8.07	8.57
Commerce and services	2.18	4.88	3.95	3.40	3.40	3.55
Information and communication	2.18	4.88	3.95	3.40	3.40	3.55
Financial intermediation and insurance	6.88	3.98	2.02	2.23	2.51	2.45
Real estate activities	7.26	7.31	7.48	8.83	8.41	8.19
Professional, scientific and technical activities	1.90	2.41	2.95	4.72	5.57	6.18
Culture	1.84	2.74	2.15	2.56	2.86	3.02

Source: authors' analysis based on INS (2014a).

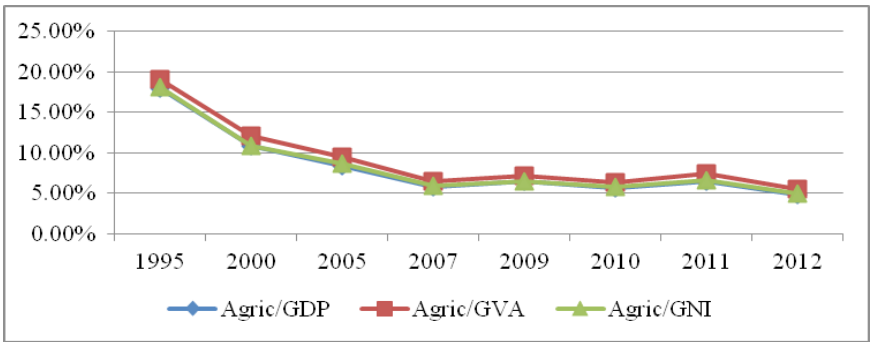
From the data presented in the above table we can observe a general trend of increasing the share of contribution to the GDP of most economic sectors excepting agriculture and financial intermediation and insurance which recorded decreases of the contribution levels. The contribution of agriculture to GDP has declined significantly over the period.

In 2012, the GDP in nominal terms was 28,638,100,000 lei, returning 29.127 billion lei per capita. Thus if a comparison of the last two years for which no statistical data, in 2011 compared to 2010, gross domestic product in real terms increased by 2.2%, and GDP per capita increased by 2, 5% and the overall national economy registered a slight recovery compared to the last two years of economic contraction (-6.6% in 2009 compared to 2008, -1.6% in 2010 compared to 2009), in 2012 it was showed an increase of 5.27% of GDP compared to 2011, while GDP / capita by 11.6%.

In 2011, the evolution of GDP by sector had the following characteristics: services posted the largest contribution to GDP, or 43.5% of total (242,396.9 million); industry ranked second place, i.e. 28.9% of GDP (160,927.9 million); construction contributed 8.5% to GDP; agriculture, hunting, forestry and fishing contributed 6.6% of GDP. In 2011, the gross added value recorded was 487,326.8 million and represented 87.5% of GDP.

In 2012 the contribution of agriculture was only 4.88%, 17.97% compared to 1995, being slightly higher than the branches that held relatively insignificant share in 1995. In Figure 2 it is showed the contribution of agriculture to GDP, GNI (gross national income) and GVA (gross value added).

Figure 2. The contribution of agriculture to the main result indicators (1995-2011)

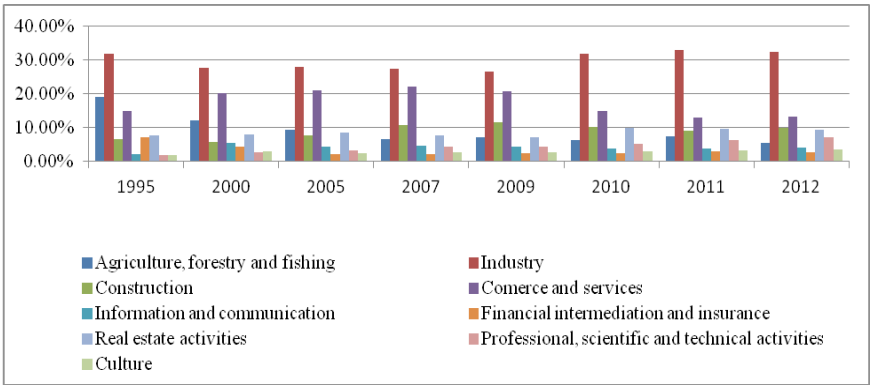


Source: authors based on INS (2014a)

Thus, if in 1995 the agriculture contributed with 17.97% to GDP, 19.7% to GVA and 18.14% to GNI, highlighting the importance that this economic sector has in the national economy, and also giving it strong agrarian transformations that occurred in massive restructuring of the national economy for integration into the community space, generated a rearrangement of national economic structures in order to reduce the structural gaps to the European model and increasing convergence towards the European space. In 2012, agriculture, yet has a relatively significant role to GDP, the values are significantly reduced, contributing with 4.88% in GDP formation, 5.59% in generating GVA and and 4.97% in achieving GNI.

From a general perspective, namely that of gross value added contribution to GDP during the transition to a market economy and achieve competitive terms and functionality, it can be seen that its level was significantly greater than the other components. Thus at the beginning of the transition process, namely in 1990, the gross value added in the national economic sectors contributed 91.9% to GDP and net taxes on products by 8.1%. Thus in the same year for the national economy, namely in 2007, it can be seen that the share of taxes in GDP increased (from 11.1% of GDP) to the detriment of GVA contribution to GDP. At the end of the review period, the share of taxes in GDP increased from 12.5% out of GDP (in 2011). GVA was achieved through concerted contribution, but not identical to the three activity sectors: primary, secondary and tertiary, as it can be seen in Figure 3.

Figure 3. Main economic contribution to GVA formation in Romanian economy (1995-2011)



Source: authors` based on INS (2014a,b)

The GDP expressed at current prices, in terms of its creation in sectors, has undergone significant changes over the period. Expressed in USD or Euro current value is directly dependent on global supply indicators of changes if the exchange rate. In terms of value, according to the reference currency, the GDP in 1990 has been exceeded since 1998 (if the expression is the current Euro or USD).

Table 2. Global supply structure in current prices (in billion, 1990-2011)

Year/ Currency	1990			2007			2011		
	LEI	EURO	USD	LEI	EURO	USD	LEI	EURO	USD
GDP	857.9	31.3	39.8	404.7	121.3	166.0	556.7	131.6	182.6
GVA	788.1	28.7	36.6	359.6	107.8	147.5	487.3	115.2	159.9
Primary sector	187.1	6.8	8.7	26.9	8.0	11.0	36.4	8.6	11.9
Secondary Sector	393.6	14.3	18.3	131.8	39.5	54.1	208.4	49.3	68.4
Tertiary Sector	207.4	7.6	9.6	200.9	60.2	82.4	242.3	57.3	79.5
Others	69.8	2.5	3.2	45.1	13.5	18.5	69.4	16.4	22.8

Source: processing based on the author's own computation from TEMPO (INS 2012) https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=CON103A

Having into account the official datasets (INS, 2008, INS, 2012) in 1990, the primary sector activities, consisting of activities in the fields of agriculture, hunting, forestry, fishing and fish farming contribute 6.8 billion Euro, respectively, 8.7 billion USD to GDP. In 1995 and 2000, the contribution of this sector has considerably reduced not only value but also as a share of GDP. In 2007, the 8.0 billion or 11.0 billion represented only 6.6% contribution of the primary sector to GDP. Expressed in USD, gross value added in the primary sector increased in 2007 compared to 1990 by 26.4% and 17.6% when expressed in EUR.

Explanation of gross added value growth in the primary sector in 2007 is simple: depreciation of the exchange rate of two currencies: Euro and USD, more pronounced when the US currency. In fact, intermediate consumption increased for years due to the accelerated growth of prices for agricultural imports, but also due to the reconstruction of flood and storm disaster, crop yields modest and low efficiency of livestock have negatively affected agricultural activities.

Although agriculture is almost a completely privatized economic sector, however, agricultural yields are much lower than in 1990, which determined the reduction percentage contribution of this sector to GDP. At the same time, one cannot omit the fact that the mechanisms of transfer of value added in agriculture did not favour this sector. The added value of this sector is transferred to the processing and marketing of agricultural products. The secondary sector's share in GDP has not exceeded in any year the amount recorded in 1990. However, it can be seen that, expressed in EUR or USD currency, in 2007, the sector has contributed 39.5 billion EUR, respectively 54.1 billion USD to GDP, and 49.3 billion EUR in 2011, 68.4 billion USD, respectively.

The evolution of the gross added value in industry is the result of limiting activities in most industrial sub-sectors, the delay in restructuring and the low economic efficiency compared to the potential of this sector.

In 1990, the tertiary sector produced only 7.6 billion EUR, respectively 9.6 billion USD out of total GDP. The value added in this sector has increased steadily. In this context, the development of our country's economy became increasingly dependent on this area. In 2011, the service sector managed to produce 57.3 billion EUR, respectively 79.5 billion USD out of total GDP. As a result of the undertaken analysis, we can say that we are witnessing a continuous process of tertiary economic activities in Romania. Obviously it should reflect a normal trend of structural changes in the economy.

In the period 1990-2011, the tertiary trend was not a natural consequence of high productivity in the primary and secondary sectors (in some years), due to which, naturally, a reorientation of saved resources from the service sector becomes possible, but rather the expression of a process of economic de-structuring of the activity of large companies, mainly industrial and the capital redirection to more profitable activities for investors, respectively the sectors that allow a higher speed of capital rotation.

The evolution of labour resources in the Romanian economy from a sectoral perspective

After a continuous growth recorded in 2005-2008, since 2009 the employment began to decline, reaching in 2011 the lowest recorded value (9.138 thousand). Among the employed people, 55.0% are men. Until 2002, most employment force was from rural environment, respectively. Since 2003, most of the employed population resides in urban areas, 55.5% respectively in 2011.

The reform and restriction of the economic system and the Romanian economy was accompanied by significant reductions in the number of staff and employees, and the changing of sectorial distribution of labour force, due to weaker employment rate of labour resources from 82.0% in 1990 to 63.0% in 1999 and 62.8% in 2011. As it had been stated (Bleahu, 2004), in 2002, the number of employed non-agricultural rural population was identical to that recorded in the year 1993 and two times lower than the values recorded in 1996.

The structure of employment by sectors of the national economy, changes that have occurred since 1989 at the macroeconomic level, produced heavy industry restructuring, which caused a decrease in employment, rising unemployment has caused a shift industrial population to agricultural activities. Besides the two major changes, the dynamic services sector has allowed the reinstatement of a large part of the working population.

Although it strives a lot, Romania still lags behind other EU countries, both in terms of socio-economic development and labour productivity. One of the main causes refers to the significant discrepancies from the structural point of view, the distribution of labour in the three main sectors of the Romanian economy.

Table 3. The evolution of the population structure by sector in Romania (in %)

Economic sector	2000	2005	2007	2008	2009	2010	2011
Primary sector (agriculture, hunting, forestry, fishing, fish farming)	41.5	31.9	29.5	28.7	29.0	28.7	29.1
Secondary sector (industry, construction)	27.3	29.0	31.4	31.4	30.0	28.5	28.2
Tertiary sector (services)	*31.2*	*39.1*	*39.1*	*39.9*	*41.0*	*42.8*	*42.7*
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: author's own processing based on TEMPO online https://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=CON103A and INS (2012).

Regarding inland economy, there has been noticed a slight increase in employment in the tertiary sector, from 31.2% in 2000 to 42.7% in 2011, the beginning of growth is reflected in the slight increase in employment in industry and services. There is a growth of 11.5% in the tertiary sector in 2011 compared to 2000, this increase being due to employment in a proportion of increasingly large services. Although in the case of agriculture notice a dramatic reduction in the labour force, from 41.5% in 2000 to 29.1% in 2011, it is one whole with relatively positive meanings, implying a reorientation of labour resources to

other absorbent economic sectors, as we have previously shown to services, which would bring in terms of employment, the national economy with the European economic and social model.

The relative parity of the evolution of population structure between agriculture and industry raises a question mark, at least in terms of economic structures. Thus the national economy has still a significant degree of dependence on agriculture, this sector still mobilizes labour resources, at least compared to those mobilized in the industry. But the effect is felt in productivity per hour worked. In Figure 4 it is shown the evolution of Labour productivity per hour worked in the period 2000-2011.

Figure 4. The labour productivity per hour worked in Romania (2000-2011)

Source: author's analysis based on INS (2012)

The labour productivity is a significant indicator in the assessment of overall economic performance. During the analysed period it was showed an increase in the overall level of productivity from 3.6 lei/hour worked in 2000 to 28.4 lei/hour worked in 2011, which means an increase of 7.8 times the level of productivity in an interval of eleven. Although it mobilizes significant percentage equal to industry, the agriculture maintains a high productivity gap to it. The labour productivity in agriculture, although it increased 7.38 times over the analysed period from 1.0 lei/hour worked in 2000 to 7.7 EUR/hour worked in 2011, represents only 18.5% of the 2011 labour productivity per hour worked levels industry in 2011. If in 2000 labour productivity per hour worked in agriculture represented 23.76% of the level registered in industry, 25.24% of that of the construction and 21.84% in commerce and services at end of period, in 2011 it represented 18.51% of the labour productivity in industry, 23.26% of the labour productivity in construction and 42.78% of the level of trade and services.

The productivity gaps in terms of productivity per hour worked labour are maintained throughout the entire analysed period what constitutes a plausible explanation in explaining productivity gaps between national and European economy. The domestic economic structure reflects the need for a major restructuring of sectors in terms of ensuring a degree of increased competitiveness. As for the Romanian economy, although it has a major

role, a lot oversized, agriculture fails in providing a high level of economic performance, managing increasingly political role of social protection for the population.

The evolution of the employee's number as economic structures reconfiguration

The average number of employees decreased in 2011 by 27.3 thousand persons compared to the previous year (4,376.0 thousand) as a result of personnel fluctuations and financial difficulties in most of the economic activities. The most pronounced declines were registered in the activities such as: health and social work, public administration and education. The distribution of employees by economic sectors in 2011 shows that 61.1% are in services (tertiary) 0.7 percentage points lower than in 2010 and 0.6 percentage points higher than in 2009. In the secondary sector (industry + construction) there worked 36.6% of total employees, 0.6 percentage points more than in 2010 and 0.6 percentage points less than in 2009.

The share of employees who worked in agriculture (primary sector) was only 2.3%, up 0.1 percentage points from the previous year and stopped at the level of 2009. As it has been found in the specialty literature (Rusu and Florian, 2003), although high percentage of the workforce employed in agriculture is a phenomenon contrary to evolution towards a market economy, in Romania's case, it is part of the national custom, the effect of a too long transition period, with at least questionable results. On other studies (Done et al., 2012; Ciutacu and Chivu, 2009b)

The private sector is the engine of the Romanian economy, absorbing most of the employed labour force. In 2011, the share of private sector employees was 66.2%, up from 2.4% in 2010. Thus over 21 years (1990-2011) the economic restriction led to cutting more than 3.8 million salaried jobs (about 8.1 million in 1990 to 4,300,000 in 2011). Most affected people are from industry (2.6 million), agriculture (0.65 million), transport (0.41 million), construction (0.37 million). The number of employees increased in trade (250 thousand), public administration (116 thousand), financial intermediation (48,000), and health (about 23 thousand).

Table 4. Evolution of the number of employees per branch (in 000, 1990-2011)

Economic sector	Total number (thousand/ persons) 1990	Changes on intervals					
		1990-1995	1996-2000	2001-2005	2006-2008	2009-2011	Total 1990-2011
TOTAL OF EMPLOYEES	8.156	-1.996	-1.537	-64	487	-697	-3.807
Agriculture, forestry and fishing	762	-259	-307	-52	-29	-7	-654
Industry	3.846	-1.231	-742	-201	-102	-347	-2.623
Constructions	704	-261	-127	32	105	-124	-375
Trade	508	152	-92	109	177	-96	250
Hotels and restaurants	195	-80	-31	6	28	-10	-87
Transport, storage and communications	724	-208	-146	-51	23	-29	-411
Financial brokerage	38	29	4	6	30	-21	48

Economic sector	Total number (thousand/ persons) 1990	Changes on intervals					
		1990-1995	1996-2000	2001-2005	2006-2008	2009-2011	Total 1990-2011
Real Estate	391	-196	-18	63	135	-4	-20
Public Administration and Defence	80	50	18	19	49	-20	116
Education	368	59	-20	-26	13	-30	-4
Health and social care	316	12	-23	16	35	-17	23
Other activities	224	-63	-53	15	23	-1	-79

Source: author's own calculations on the basis of INS (2014a,b)

In the period, 1990-2011, only in the subinterval 2006-2008, the evolution trend of the total number of employees was positive, the number increased by about 487,000 people; the industry and agriculture showed negative trends these years (the number of employees in agriculture decreased by 29,000 and 102,000 people in the industry). Referring to the high degree of working population in agriculture, especially after 1990 (Mihailescu, 2005) notes that this is the result of economic restructure that contributed to the reorientation of the farming population, the inability to work in the other economic sectors, which are in decline generated by a chaotic economic reform.

Conclusions

The analysis of the evolution of Romanian economy in terms of economic structures represents a significant step in understanding the mechanism and determinants in ensuring convergence with the European economic model. The agriculture has a role in achieving massive influential Romanian macroeconomic performance as one of the major economic sectors that mobilize human resources.

In Romania's case, the high degree of rurality makes agriculture play a pivotal role in the rural communities, providing not only a standard of living for the rural population for which production is mostly intended consumption, but the support in mitigating the effects of transition to a market economy. Although overall levels showed an improvement in outcome macroeconomic indicators and national economic structures, transformations that marked the national economic system in the transition to a functional market economy and highly competitive, are still not complete, emphasizing the need for compliance to the needs of European economic and social model.

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METHODOLOGICAL APPROACHES TO VETERINARY SERVICE EFFICIENCY EVALUATION IN LIVESTOCK

Natalia Bannikova[1], Anzhelika Baicherova[2]

Summary

This paper presents the contradiction between modern views on the role of veterinary science from the concept "one health" position, which implies an important role in health assurance and the welfare of the whole veterinary care society, and existing methodological support of its efficiency evaluation. The analysis of existing methods of veterinary attendance efficiency evaluation was conducted on the case of Stavropol Territory and with the help of canonical correlations method their disadvantages were shown. The paper provides rationalization for the need of veterinary science external effect consideration, which operates in healthcare and environmental protection. The procedure for calculating the integral coefficient of veterinary service efficiency was proposed, which allows taking into account the complex of internal and external effects.

The integral coefficient may be used in the process of comparative analysis, in the specification of strategic growth priorities, in the motivation system integration of veterinary service employees.

Key words: *efficiency, evaluation, veterinary service.*

JEL: *Q57, P21*

Introduction

Animal diseases constitute serious threat not only to the livestock industry, but for health and well-being of society as a whole. That is why the necessity of integrated approaches for the definition of animals' veterinary care role, functions and organization as evidence-based as from the point of view of further development directions is actively discussed by researchers from different countries. Based on Dr. Calvin Schwabe's vision of „one medicine", researchers consider the role of veterinary science in protecting food security and safety, prevention and control of antroponotic diseases, removing a threat of antibiotic

1 Natalia Bannikova, Ph.D., Doctor of Economics, Professor, Stavropol State Agrarian University, Faculty of Economics, 12 Zootekhnicheskiy by-street, 355017 Stavropol, Russian Federation, Phone: +7 86 52 35 74 66/ext. 1231, E-mail: nbannikova@mail.ru

2 Anzhelika Baicherova, Ph.D., Senior lecturer, Stavropol State Agrarian University, Faculty of Economics, 12 Zootekhnicheskiy by-street, 355017 Stavropol, Russian Federation, Phone: +7 86 52 35 74 66/ext. 1230, E-mail: corsta@mail.ru

sensitivity, environmental and ecosystem protection, readiness to bioterrorism threat, and also to the appearance of new agents emerge to threaten human and animal populations (Pappaioanou, 2004; Sargeant, 2008; Steele, 2008; Davis, 2008). Gradually the concept "one medicine" should be transformed into the concept "one health", and on a global scale, considering developing ecosystem approaches and strengthening globalization processes (Zinsstag et al., 2011).

However, the withdrawal from traditional views on the role and functions of veterinary science is related to a number of problems. In particular, the approaches to veterinary services evaluation are required to be developed, including economic efficiency. Methods of efficiency evaluation of certain veterinary measures or animals' specific diseases prevention and treatment systems are sufficiently developed and widely used in research and practice. To provide a rationale for the choice of more efficient means of animal protection, different methods are used, from survey and expected damage calculation to economic and mathematical models construction (for example, Reist et al., 2012; Boklund et al., 2013; Murai et al., 2014). Nevertheless, the evaluation of veterinary services efficiency as infrastructural subsystem of territorial agrarian system, and also socio-economic system as a whole, didn't get adequate substantiation.

This issue is particularly important for developing countries and countries with transitional economies, in many of which the institutional and organizational reform of the veterinary service takes place (Amankwah et al., 2014; Rutabanzibwa, 2011; Rich and Perry, 2011; Nikitin and Sabiryanov, 2012). Depending on how the results of veterinary service will be evaluated, the directions and rate of its further reforms will be determined, including its role in health providing and well-being in the society.

Materials and Methods

The analysis of existing methods of veterinary services efficiency evaluation was conducted on the case of Stavropol Territory, which is among the most advanced in terms of agricultural production regions in Russia. Data for the present study purposes are from reports of Stavropol Territory Veterinary Department.

For the regional veterinary service efficiency evaluation, the existing methods were used. The first one was developed by I. N. Nikitin, which is stated by Veterinary Department of Ministry of Agriculture of the Russian Federation and specified in textbooks, being in use to train specialists in veterinary science (Nikitin and Apalkin, 2007). According to this method for economic efficiency specification of preventive, therapeutic and remedial measures, focused on diseases prevention, animal mortality and loss of livestock production, the following indicators system should be used: economic damage by loss of livestock production, economic damage by animal mortality, alienation, compulsory extermination, compulsory animal slaughter, economic damage by breeding value decrease, economic damage by product quality decrease, economic damage by animal yield reduction, economic damage by screening of affected carcasses, organs, materials and animal products withdrawals; economic damage, which was stopped by preventive measures and diseases

liquidation; economic effect, generated in preventive, therapeutic and remedial measures; saving of material and operational maintenance; economic efficiency of veterinary services; pay-back period of additional investments to equipment for veterinary services; labour efficiency of veterinary physicians.

The second method was developed by R. V. Miroshnichenko and it is based on I. N. Nikitin's approach. Its main dissimilarity is aggregation of effect sums from veterinary services conducted and their reconciliation with costs of medical and preventive activities costs of veterinary service support (Miroshnichenko, 2005). Thus, the present method gives an opportunity for integrated index calculation, which allows us to give generalized results evaluation of veterinary services activities. However, the disadvantage of any integrated index is the inequality of certain factors, which form it, influence. For the research of these factors influence, the method of canonical correlation was used and its algorithm was set out in relevant publications (Thorndike, 2000).

For the specification of brucellosis disease incidence as one of the serious diseases, which is general for people and animals, the data from Federal Hygiene and Epidemiology Centre of Federal Service for Oversight of Consumer Protection and Welfare were applied.

Results

More than 20 years ago there was a shift from complete government control to market relations in Russia, nevertheless, velocity, sequence, depth and results of the reforms in different industries have considerable discrepancy. But particular problems in the liberalization process are observed in industries related with infrastructure and they are still entirely or partially in the area of government control. The demand for that is connected with economic reasons (natural monopoly, for example, in electrical energy industry), and also with the necessity of public interests protection) population and animal protection from epidemics.

That is why the state has still a key value in veterinary services organization in Russia. Entrepreneurship in the sphere of veterinary service sufficiently developed in cities and towns, but in rural localities, the owners of small farms and farm livestock don't always aware the importance of veterinary activities (especially preventive ones) and have opportunity to pay for them. Thus with the view of veterinary well-being adherence at the territories and small agricultural producers support, every region has its own advanced state veterinary service.

For Stavropol Territory livestock is structure-forming and some of the most socially important branch of agriculture. The share of animal products in total volume of agricultural products in 2013 was 30.8 %. Stavropol Territory livestock is rank second in sheep population and wool production, ninth in poultry population, and tenth in cow population and milk production in the Russian Federation.

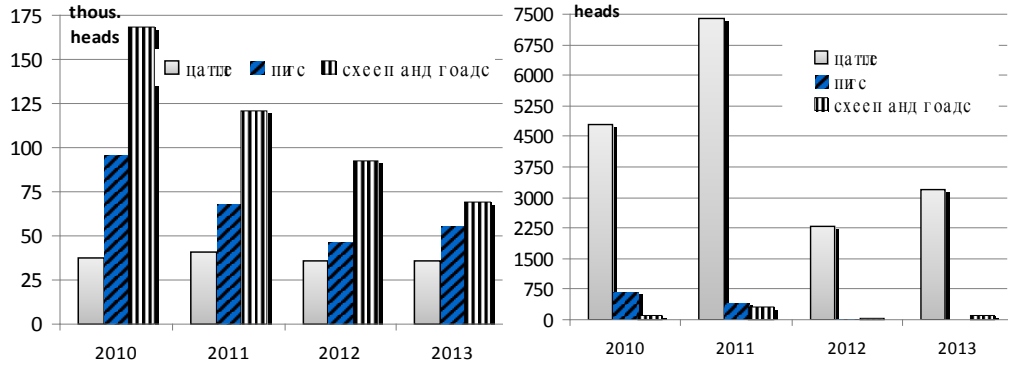
State Veterinary Service of Stavropol Territory provides services for this livestock population and consists of Veterinary Department, Stavropol territory station for animal

diseases control, 26 district and 5 town state veterinary institutions with total number more than 1,200 employees. Besides, more than 330 veterinary specialists work in large agricultural enterprises.

The condition of veterinary well-being in the region is traditionally evaluated with the help of indicators, which reflects data on diseases and animal mortality. During the last 4 years, annual animal mortality in Stavropol Territory was from 2.8 to 4 thousand in animal units of cattle and from 3.6 to 33.6 thousand in animal units of sheep, which is not more than 1.6 % with regard to available animal population. The situation is still complicated in pig breeding in Stavropol Territory. It is connected with long-term persisting threat of African swine fever flare. However, the measures taken to control the conditions of pigs and prevent the threat of the spread of African swine fever, led to the fact that during the last two years flares of this disease were not observed.

As shown in Figure 1, the major share of animal diseases is accounted for non-communicable diseases. The most common among them are diseases of the reproductive organs of cattle, diseases of the digestive organs of pigs, and breathing system of sheep and pigs.

Figure 1. Dynamics of livestock diseases in Stavropol Territory



a) non-communicable diseases b) infectious diseases

Source: Livestock and poultry population. Livestock production, 2014.

Diagnostic and research activities aimed to prevent threat of mortality and the spread of dangerous diseases play an important role to maintain veterinary well-being. Based on the results of diagnostic studies the most important manipulation is conducted; they are aimed to maintain the epizootic welfare - vaccination and veterinary treatment for farm animals. During the study period, the number had increased. For example, the number of vaccinations and veterinary treatment of cattle on the main types of diseases such as aphthous fever and Siberian plague increased by 12.5% and 17.0%, respectively. According to Stavropol Territory veterinary service data, the total value of veterinary services in 2013 was 633.3 million. Efficient and focused work of veterinary specialists of Stavropol Territory became the reason that in recent years, in the region there were

no recorded cases of such especially dangerous diseases as Siberian plague, aphthous fever, classical swine fever. Thus, we can conclude that in general, in Stavropol Territory the veterinary situation is prosperous; there are low rates of morbidity and mortality of livestock, which in recent years have tended to decline.

As is known, veterinary service costs in livestock constitute a significant share and should be justified due to improved production results or reduction of losses. Therefore the evaluation of economic efficiency is essential as for certain activities as for veterinary service in general.

To evaluate the efficiency of Stavropol Territory veterinary service the method proposed by R. V. Miroshnichenko (2005) was used. The calculation results are presented in Table 1.

Table 1. The calculation of economic efficiency of Stavropol Territory veterinary service functioning

Indicator	2010	2011	2012	2013
Prevented damage by animal diseases, million RUB	2,370.5	2,943.4	2,205.4	232.1
Actual damage by animal diseases, million RUB	1,009.2	836.6	816.1	745.9
Additional value obtained by increasing the number and improving the quality of products, million RUB	315.0	351.0	392.0	411.6
Economy of material and labour costs as a result of more efficient tools and methods usage for veterinary service, million RUB	6.5	5.4	1.1	1.6
Costs of preventive, therapeutic and remedial measures, million RUB	130.2	146.4	332.1	323.9
Costs of veterinary service support, million RUB	517.0	587.5	424.7	579.7
Indicators of regional veterinary service functioning economic efficiency	1.6	2.4	1.4	1.2

Source: Author's development based on data from Stavropol Territory Veterinary Department, 2010-2013.

According to Table 1 there is the dynamics of economic efficiency indicator reduction that can be explained by the increase in anticipating costs of preventive, remedial and therapeutic measures. Thus, it appears that the positive trend to reduce morbidity, growth in livestock production as key indicators of veterinary service activities, do not have the expected effect on its performance evaluation. Positive results are distorted because of the influence of external inflationary factors beyond the control of the veterinary infrastructure functioning.

This is primarily indicative of used method imperfection. To consider more details of separate elements influence and the results of calculations and make more objective conclusions, the dependence of Stavropol Territory veterinary service efficiency on a number of key factors was investigated.

As an instrumentality basis the method of canonical correlation was used, intended to establish the nature of the link between the set of the determinants and the resultant variables. The main advantage of the canonical correlation method is the possibility of

establishing correlation connection between the two groups of factors, not limited by the necessity of multi-collinearity of indicators exceptions. Furthermore, in terms of a small amount of the original statistical data, the method allows not to restrict significantly the possible range of the variables used (Thorndike, 2000).

As the variables, indicators, that according to the existing method of veterinary service performance evaluation were crucial, were used. These include: the group x_1 - $x_{4,}$ which characterizes the effect, and the group $x_5 – x_6$, which characterizes the embedded component.

x_1 - prevented damage by animal diseases, which reflects the economy of agricultural producers costs from avoided mortality and loss free conditions of animal products;

x_2 - actual damage by animal diseases, which reflects the actual size of losses from mortality, compulsory slaughter and culling, as a result of animal diseases. The difference between prevented and actual damage, which can be determined when the efficiency index is calculated. The efficiency index represents the economic efficiency which is obtained from the prevention of animal diseases spread;

x_3 - additional value, received due to increasing the number of quality and quantity of animal products in consequence of medical and preventive activities;

x_4 – economy of financial and labour due to application of more efficient means and methods of veterinary measures, which shows the level usage of new, efficient means of zoonosis'' prevention;

x_5 - costs for preventive, diagnostic and treatment measures, which have the form complex of means for preventing animals diseases;

x_6 – costs for management of veterinary service.

Actual values of mentioned earlier variables which characterized activity's efficiency of veterinary service in Stavropol Territory for 8 years since 2006 till 2013 were used as basic data for conducting of canonical analysis.

The results of calculation have shown, that canonical correlation index is statistically significant as its constancy in different variations has characterized index fixity which characterizes the results of veterinary service in different changes.

Closeness of relationship between canonical variables is characterized by value of canonical correlation index which is 0.996. It means strong correlation between actual variables and resulting indicators which was received after linear combination conducting.

Canonical variables with canonical index of correlation $r_1 = 0{,}996$ for actual set of variables (here and after they are with standardized value) have the form:

$$V_1 = 0{,}367_{x_1} + 0{,}405_{x_2} - 1{,}010_{x_3} + 0{,}015_{x_4}$$

$$U_1 = -0{,}897_{x_5} - 0{,}849_{x_6} \qquad (1)$$

Indexes in the formulas of canonical variables reflect the power of impact of actual variables on the meaning of another canonical variable. Following the algorithm of calculation, on each stage one or several less significant factors should be rejected and then conduct the calculation again till the maximum indexes of actual and shorted variables' composition won't be differed significantly. That is why variable x_4 was rejected for the next step as it gives the less contribution to V_1. Besides economy of financial and labour costs as a result of application of more efficient measures and methods do not have significant meaning in calculation of veterinary service management efficiency. Its quantitative meaning testify the lack of new and more efficient measures and methods of preventive, diagnostic and treatment measures whereby economic effect got after their implementation does not play significant role in management efficiency of veterinary service.

In the next step of calculations, the following canonical indexes were received:

$$V_2 = 0{,}343_{x_1} + 0{,}395_{x_2} - 0{,}998_{x_3},$$

$$U_2 = -0{,}884_{x_5} - 0{,}274_{x_6} \qquad (2)$$

It should be mentioned that canonical indexes with remained variables have been changed insignificantly in V_2, and correlation in U_2 has been changed noticeably. This has reflects the fact that the change of variables, reflecting the effect of veterinary service activity, influences much more on costs of diagnostic and treatment measures conducting then on costs of veterinary service management.

Statistically significant canonical index of correlation has remained unchangeable (0,996) that is evidence of the least meaning of rejected variable and correctness of its reduction activities. Its value points out on almost linear dependence between canonical variables.

The results of calculations evidence that prevented (x_1) and actual damage (x_2) have significantly less impact on indicator of efficiency of veterinary service in comparison with additional value received due to increasing the quantity and quality of service (x_3). The significance of cost driver in veterinary service is also high (x_5). Such a results could be explained by the fact that the significant amount of additional value, received due to increasing of quantity and quality of service is identified by the situation which is in the animal breading now and also by trends of growth of prices for animal products

At the same time, the influence of the additional cost of the action is limited by to the typical agrarian sphere mechanism which is "price scissors", as the costs of veterinary preventive actions grow more intense. This relation leads to the result, according to which the performance indicator of veterinary service in recent years is reduced.

So, the disadvantage of the method is significant impact of inflation factors on the of economic efficiency indicators calculation results. Distorting influence primarily has the rising cost of preventive and curative measures, on which the veterinary service can not affect.

Confirmation of this fact is the data in Table 2, which reflects the dynamics of the prices of some veterinary drugs, the most heavily used in modern veterinary care. Rise in price of raw materials for the production of some vaccines, steady demand from the veterinary services, the lack of direct competition for some types of goods in the market of veterinary bio industry contribute to the annual increase in costs for the vaccination of cattle, which directly affects the cost of animal products.

Table 2. Changes in prices for the most popular veterinary products

Name of vaccine	Price per unit, RUB				Variation (2013 to 2010, in %, (+,-), p.p.)
	2010	2011	2012	2013	
A vaccine against brucellosis in farm animals from strain 19	3,583.7	3,583.7	3,583.7	3,642.9	101.7
FMD vaccine culture mono- and multivalent inactivated adsorbed	16,300.3	16,926.5	17,015.2	19,926.5	122.3
Virus vaccine against classical swine fever from strain LK-VNIIVV and M culture dry	423.5	443.0	680.2	703.8	166.2
A set of components for the diagnosis of brucellosis in animals RA, and RSK, RDSK	543.9	557.5	564.1	575.5	105.8
Set for the serological diagnosis of bovine leukaemia	5,004.8	6,255.9	6,120.5	6,255.9	125.0
Test system for detection of ASF virus DNA by PCR	6,540.0	7,845.0	7,890.1	7,925.0	121.2

Source: Annual reports of Stavropol Territory Veterinary Department, 2010-2013.

As for the costs of veterinary services, the opposite dynamics are observed, namely a decrease of 17.8%. This situation can be explained by the shortage of budgetary funds, as well as staff reductions of veterinary service during ongoing reform.

Thus, a significant increase in the cost of treatment and preventive measures, and a slight reduction in the cost of the veterinary service of the region resulted in a noticeable increase in costly component in the computation of the efficiency of the veterinary service. This situation, in our opinion, determines the need for further improvement of the methodology for evaluating the performance of veterinary services.

Discussion

Based on the conception "one health" in evaluating the effectiveness of the veterinary service should consider not only the results obtained in the livestock industry, but also the effects that occur in the field of public welfare. In this matter it is advisable to use the approach of V. V. Kafidov (2012), according to which one should distinguish between the internal and external efficiency of infrastructure sectors.

External efficiency means creating the infrastructure of economic benefits for society. For veterinary infrastructure, these benefits will be resulted in saving money at the elimination of foci of particularly dangerous animal diseases, reducing the incidence of zoonotic diseases and, as a consequence, reduce costs, not directly related to the object of veterinary care - cattle. It may be costs associated with disabilities sick people, as well as environmental damage.

Under the external efficiency implies creating the infrastructure of economic benefits for society. For veterinary infrastructure, these benefits will be reduced to save money at the elimination of foci of particularly dangerous animal diseases, reducing the incidence of zoonotic diseases and, as a consequence, costs reduction, not directly related to the object of veterinary care – cattle breeding. It could be costs associated with disable sick people, as well as environmental damage.

Internal efficiency is expressed in achieving their goals of a particular infrastructure sector. In this case, the internal efficiency of the veterinary infrastructure reflects the rational use of material, labour and financial resources, the use of appropriate methods and tools to address issues related to safeguard animal health.

To assess the internal efficiency of the veterinary service is advisable to use the formula underlying the methodology proposed I. N. Nikitin:

$$E_t = \frac{P_d + C_a + S_c - C_v}{C_v} \qquad (3)$$

where, E_t - economic efficiency of veterinary measures ("health-related efficiency");

P_d - economic damage prevented as a result of veterinary measures, RUB;

C_a - value received additionally by increasing the number and improving the quality of products, RUB;

S_c - saving labour and material costs as a result of more effective tools and methods for veterinary measures, RUB;

C_v - the costs of veterinary measures, RUB (Nikitin and Apalkin, 2007).

However, in integrated assessment of internal efficiency of the veterinary service it is not sufficient to use only the parameters characterizing the damage prevented and the costs of the relevant activities. These cost parameters, as already demonstrated above, to a certain extent distort the results of Veterinary Service. Therefore, it is advisable to assess the internal efficiency to form a system of indicators to include additional assessment indicators.

Firstly, in terms of the reform of the state veterinary service, accompanied by a reduction of personnel, it is appropriate to assess the impact of professional level of specialists, i.e. efficient use of the veterinary service of its human resources. For this, by comparing the actual amount of work performed by veterinary per employee and the appropriate standard ratio is proposed to estimate the level of intensity of veterinary specialists. This indicator is a summary nature, as aggregated for complex therapeutic measures provided veterinary service.

$$C_{s.in.lab} = \sum_{i=1}^{n} \lambda_i \frac{(A_w / N_e)_{fact_i}}{(A_w / N_e)_{norm_i}} \qquad (4)$$

where, $C_{s.in.lab}$ - consolidated ratio of the intensity of labour veterinary experts;

A_w - volume of completed veterinary specialists work;

N_e - number of employees, people.;

λ_i - weight index reflecting the relative importance of the work performed and defined by experts, $\lambda_i > 0,\ i = 1,...,n, \sum_{i=1}^{n} \lambda_i = 1.$

Secondly, the level of veterinary welfare in a particular territory reflects the level of morbidity and mortality rate of animals. These indicators are also advisable to take into account in the evaluation of internal efficiency.

Thus, comprehensive evaluation allows us to give the integral index of internal efficiency of the veterinary services, taking into account the cost-effectiveness of therapeutic and preventive measures, the labour intensity of veterinary specialists, as well as the current level of morbidity and mortality of livestock. For this the following formula is advisable:

$$C_{\text{int}} = E_t \times C_{s.in.lab} \times \frac{1}{L_{morb}} \times \frac{1}{L_{mort}} \qquad (5)$$

where, C_{int} - the integral index of internal efficiency;

L_{morb} - incidence of animals;

L_{mort} - level of animals' mortality.

To evaluate the external effectiveness of veterinary service it is needed revealing the effects of veterinary activity, manifested in such areas as health and environmental protection.

Modern veterinary practice involves a series of activities leading to pollution, depletion and deterioration of land. One of the inevitable consequences of the implementation of veterinary measures is the collection, recycling and disposal of biological waste which is a biological material obtained as a result of clinical work and the elimination of foci of animal diseases. Special danger is infected animal carcasses, which should be eliminated in specially designated and equipped burial grounds. Consequently, the burial of infected animals is the cause of environmental pollution. The problem of biological waste disposal and destruction is relevant not only for Russia (McLean et al., 2007).

In addition, the negative impact on the environment can render a treatment of livestock conducted regularly by veterinary service they are disinfection and disinfestations, which also contribute to the deterioration of land as a result of exposure to chemical disinfectants and formulations.

Obviously, the damage to the environment due to veterinary measures should be evaluated. The method approved by Order of the Ministry of Natural Resources 08.07.2010, № 238. (Method of calculating the amount of harm caused by soil as object of protection of the environment) can be used.

Calculation of the value of damage as a result of disposal of production and consumption is carried out by formula:

$$D_w = \sum_{i=1}^{n} (M_i \times T_w \times S) \times C_s \qquad (6)$$

where, D_w - amount of damage as a result of disposal of production and consumption (RUB);

M_i - weight of waste with the same hazard class (ton);

n - number of waste types, grouped by hazard classes within an area that has the waste disposal;

T_w - fee for calculating the amount harm caused to soil as environmental objects when soil degradation as a result of unauthorized waste disposal (RUB/ton);

S - polluted site area (m^2);

C_s - index, depending on the category of land and purpose of land on which there is a contaminated area, agricultural land 1.6.

Calculation of the value form in the amount of damage by chemical pollution of soil is carried out by the formula:

$$D_c = L_c \times S \times C_d \times C_s \times T_c \qquad (7)$$

where, D_c - amount of damage in the chemical soil pollution (RUB);

L_c - degree of chemical pollution during treatment, disinfection, etc. is assumed equal to 1.5;

S - polluted site area (m^2);

C_d - index depending on the depth of chemical contamination or damage to the soil;

C_s - index, depending on the category of land and the target;

T_c - fee for calculation of the harm amount caused to soil as environmental objects in the chemical soil pollution (RUB/m^2).

Total damage caused to the environment is determined by adding the two selected types of damage:

$$D_e = D_w + D_c \qquad (8)$$

where D_e - overall damage to the environment due to veterinary activities, rub.

To determine the index of efficiency of veterinary activities manifested in the field of environmental protection, the economic damage caused by the veterinary service of the environment should be considered. In this case, the economic damage to the

environment is considered as a negative result, and high costs to prevent the spread of animal diseases as compared to the damage as positive one. Consequently, in the case of exceeding the costs of pollution prevention over the damage, the result of performance of veterinary services can be considered effective.

$$E_{ep} = 1 / \frac{D_{env}}{C_{v.n.}} \qquad (9)$$

where, E_{ep} - effectiveness of veterinary measures, manifested in the field of environmental protection;

D_{env} - economic damage caused to the environment in the process of veterinary measures, RUB;

$C_{v.n.}$ - costs of veterinary services on prevention of environmental pollution, RUB.

The important role of veterinary measures effectiveness is in preservation of life and health of people. Is known, there are a lot of infections and parasitic animal diseases common to humans and animals. Man is infected by them in contact with sick animals, as a result of eating the meat of sick animals, contaminated water and through blood-sucking insects and mites. The role of the veterinary service in healthcare is to minimize the health and social consequences of these diseases by monitoring and immunization of animals in order to prevent human infection.

The most widespread and dangerous diseases common to humans and animals are: Siberian plague, rabies, brucellosis, rabbit disease, ornithosis or psittacosis, toxoplasmosis, fascioliasis, leptospirosis, flesh worm disease, echinococcosis, tuberculosis, aphtha, salmonellosis and others.

One of the most widespread diseases which are common to humans and animals is brucellosis. The problem of protecting people and animals from the disease continues to be relevant for many countries (Mainar Jaime and Vázquez Boland, 1999; Marcotty et al., 2013).

Brucellosis is classified as occupational disease, as the majority of patients are infected during labour activity. Currently morbidity statistics in Russia by types of activities is as follows: 35.9% - animal keepers, 30.5% - veterinarians and paramedics (Overview of the epidemiology of brucellosis in the Russian Federation, 2014). Brucellosis is extremely dangerous and socially significant infection, bringing significant economic damage and cause a high level of patients' disability - 18.3%. In regions with high morbidity rate this figure exceeds 52%. According to preliminary data of the World Health Organization in the Russian Federation, there are about 3.0 thousand patients with brucellosis. The annual cost of prevention, treatment and maintenance of people with brucellosis, according to experts of WHO is about 63 million RUB. Minimization of morbidity cases of brucellosis and other antroponotic animal diseases depends on the veterinary service efficiency.

To determine the veterinary service efficiency, which is manifested in healthcare, use the following formula is suggested to use:

$$E_h = 1 / \frac{D_{hp}}{C_{v.h.}} \qquad (10)$$

where, E_h - veterinary activities efficiency, is manifested in healthcare sphere;

$C_{v.h.}$ - veterinary services costs to prevent antroponotic animal diseases, RUB;

D_{hp} - economic damage, caused to the health of people, rub., the value of which is calculated by the following formula:

$$D_{hp} = \sum_n X_c \times C_t \times C_{od} \times C_{d.s.} \qquad (11)$$

where, X_c - number of diseased, people;

C_t - treatment costs per patient, RUB;

$C_{d.s.}$ - disease severity index (is determined by experts on the basis of the characteristics of a disease);

n - the number of diseases considered in the calculation.

For integrated evaluation of veterinary service efficiency, taking into account both external and internal effects, it is appropriate to calculate the integrated index of veterinary well-being provision efficiency in territories:

$$C_i = w \times C_{\text{int}} + (1 - w) \times C_{ext} \qquad (12)$$

where, C_i - integrated index of veterinary service economic efficiency;

w - weight index, reflecting the degree of importance of the internal effect in the results of the veterinary service. Weight index *w* is determined by expertise, based on the conditions of a territory. Thus, for Stavropol Territory, according to experts of Stavropol regional station for animal diseases control, this figure should be 0.85.

Thus, the proposed integrated index allows us to give generalized evaluation of the providing veterinary well-being efficiency and to compare the results of the individual structural units of the veterinary service. The analysis of this index components allow to justify key objectives in the field of veterinary services in particular territories, taking into account the effect of external and internal activities.

Conclusions

Existing approaches to the veterinary service efficiency evaluation, as a rule, are focused on complex assessment of veterinary activities and take into account the results, which can appear only in livestock. In addition, the evaluation results are influenced by characteristic for agrarian sector effect of "price scissors", due to the advanced growth for veterinary medicines and materials prices, compared with the prices of animal products. To eliminate these disadvantages, the existing methodological support should be upgraded.

The efficiency of veterinary infrastructure broadly defined should be regarded as the indicator of veterinary well-being success of a territory in terms of both internal and external effect. The internal effect is manifested in the results of therapeutic activities on reduction of farm animals' morbidity, and the external effect is reflected in the areas that are not directly the subject of veterinary services (healthcare, environmental protection).

Supposed integrated index allows us to reflect the external and internal effects holistically, with the help of which it is possible to make the comparison of the results of veterinary service activities in different regions. Comparative analysis of the integrated index components will clarify the strategic goals and identify current challenges of veterinary service in a particular area.

Further research into the practical application of the indicators included in the integrated index calculation, can be directed to the development of recommendations for the construction of Balanced Scorecard (BSC) on their basis, which will allow to motivate employees of veterinary service in achieving strategic goals.

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Review Article

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THE IMPACT OF FOREIGN TRADE IN AGRICULTURAL PRODUCTS OF BOSNIA AND HERZEGOVINA WITHIN THE FRAMEWORK OF CEFTA 2006

Ferhat Ćejvanović,[1] Marko Ivanković,[2] Marija Lasić,[3] Željko Vaško[4]

Summary

In modern conditions, characterized by the growing importance of foreign trade between the countries, relations of a country with international environment play an increasingly important role in economic development. Over the last decade the process of economic integration through the removal of barriers for the free movement of goods, services, money and people has improved job creation and economic growth. From economic cooperation with foreign countries should expect positive effects on the economy of the state if the external economic factor used in accordance with the plans and programs of economic development of a country. Thereto, there are social forces that can decide relatively independently to all elements of internal development and cooperation with foreign countries. The objective of this study was to investigate the effect of the CEFTA 2006 on the foreign trade of agricultural products in Bosnia and Herzegovina. In this respect it may be noted that foreign trade of agricultural products has an impact on the agricultural sector in Bosnia and Herzegovina.

***Key words**: CEFTA 2006, foreign trade, agricultural products, Bosnia and Herzegovina.*

JEL: *Q02, Q13, Q17*

1 Ferhat Ćejvanović, Ph.D., Associate Professor, external associate University of Tuzla, Faculty of Economics, Univerzitetska Street no. 8, 75000 Tuzla, Bosnia and Herzegovina, Phone: +387 49 490 170, E-mail: ferhat.cejvanovic@gmail.com

2 Marko Ivanković, Ph.D., Full Professor, University of Mostar, Faculty of Agriculture and Food Technology, Biskupa Čule Street bb, 88000 Mostar, Bosnia and Herzegovina, Phone: + 387 36 337 102, E-mail: mivankovic@faz.ba

3 Marija Lasić, M.Sc., Teaching Assistant, University of Mostar, Faculty of Agriculture and Food Technology, Biskupa Čule Street bb, 88000 Mostar, Bosnia and Herzegovina, Phone: + 387 36 337 102, E-mail: marija.lasic@apfmo.org

4 Željko Vaško, Ph.D., Associate Professor, University of Banja Luka, Faculty of Agriculture, 78000 Banja Luka, Bulevar vojvode Petra Bojovića 1a, Bosnia and Herzegovina, Phone: +387 51 330 929, E-mail: zeljko.vasko@agrofabl.org

Introduction

After almost five years of experience in trade liberalization in Southeast Europe, gained through the implementation of bilateral free trade agreements, countries in the region have been at the end of 2006 decided to enhance their economic and trade cooperation and to conclude a single free trade agreement known as CEFTA (Central European Free Trade Agreement) 2006. Bosnia and Herzegovina (BaH) signed the agreement on modification and accession to CEFTA on December 19th 2006 in Bucharest and the agreement entered into force on November 22nd 2007.

Even before this agreement, socio-historical, geographical, cultural and other factors had effects that Bosnia and Herzegovina most of its foreign trade performed with the countries of the Danube basin (e.g. in the period 2000-02, 60-70%), (Vaško, 2003) of which most later joined CEFTA.

The agriculture has a special place in the process of free trade given the usually limited effects in the liberalization of agricultural products. A good example is the free trade area of Central European countries from CEFTA group where the most sensitive agricultural products are classified into individual groups and in mutually accepted rules (Ćejvanović et al, 2011).

Most countries make efforts in making the above agreements to provide a balance of trade of agricultural products in a way that they have approximately the same export options as well as the partner with whom the agreement concluded. More competitive and developed countries often granted asymmetrical concessions in favor of the weaker partner and they often remain unused. Anyway, the agreements on trade liberalization create prerequisites for the promotion of mutual trade which contributes to the growth of economic activity and strengthening the role of the market (Ćejvanović, 2009).

When signing a contract on trade liberalization it is important to take care of ensuring peer conditions to domestic economies by such agreements as well as to take care not to jeopardize a vital economic and national interests (Ćejvanović et al., 2009).

Advantages or benefits which, among other things, bringing the Agreement are as follows (MOFTER a):

1. Successful regional, and within that particular economic and trade cooperation is an important prerequisite for convergence countries of the Western Balkans to the European Community;
2. The new agreement has facilitated administration of contracts i.e. simplification of contractual relations;
3. The agreement introduces new areas of which is for Bosnia and Herzegovina particularly important the harmonization of investment conditions in the region because this country is a net recipient of investment;
4. Diagonal cumulation of origin of goods is applied among all CEFTA members; and
5. Improved mechanisms for resolving disputes, facilitating the removal of technical barriers to trade etc.

Compared with bilateral agreements CEFTA agreement (MOFTER a) is far more complex and comprehensive. Besides being concerned plurilateral agreement it introduces some new issues that previously were not covered or significantly improves the provisions that in bilateral agreements showed as insufficiently precise or effective in application.

The complexity is reflected not only in its content but also in the structure. Since the "old" CEFTA proved to be good preparation for EU membership from its signatories it was decided to form a new agreement includes modified old one and the simultaneous accession of new members.

The signatories are: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Republic of Moldova, Montenegro, Romania, Serbia and mission of United Nations Interim Administration in Kosovo on behalf of Kosovo in accordance to Security Council Resolution 1244 of the United Nations. Although they signed the agreement, joining the EU on January 1st 2007 Romania and Bulgaria have ceased to be members of CEFTA. The Republic of Croatia became a full member of the EU on July 1st 2013 which means automatic termination of membership in CEFTA (Ćudina and Sušić, 2013.)

Materials and methods

The paper used secondary data sources such as data from publications of the Ministry of Foreign Trade and Economic Relations (MOFTER) Bosnia and Herzegovina, published scientific and professional papers that deal with this issue. Also been used data from BaH Agency for Statistics and the Department of Statistics of FBaH. Based on the data collected were used scientific methods: desk research, descriptive methods, methods of analysis and synthesis, methods of induction and deduction as well as a comparative analysis method. Control sample was used statistical reports of other CEFTA countries 2006. Reference period is 2005-2011.

Results and discussion

In December 2006 in Bucharest was signed an agreement on amendments and accession to the Central European Free Trade Agreement (CEFTA 2006).

The agreement was subject to ratification, acceptance or approval in accordance with the requirements laid down in national law. Instruments of ratification, acceptance or approval have been deposited with the depositary. The Agreement entered into force in second half of the 2007. Bilateral agreements signed until then were cancelled on the day of the new one entry into force.

In the foreign trade of agricultural products of Bosnia and Herzegovina and the members of CEFTA 2006 can be viewed and analysed the total import and export of agricultural products.

Foreign trade of agricultural products between BaH and CEFTA 2006 members

In order to perform comparative analysis and comparison of trends in trade of agricultural products between Bosnia and Herzegovina and other CEFTA members with overall trade in agricultural products of Bosnia and Herzegovina with the world, below are presented trade data with corresponding trends in trade in agricultural products between Bosnia and Herzegovina and CEFTA 2006 and between Bosnia and Herzegovina and the world. Data from the corresponding analyses were presented for the period 2005-2011, i.e. for the period prior to the entry into force (2005 and 2006) and the entry into force (2007-2011). In Table 1 is shown the foreign trade of BaH and other members of CEFTA 2006 for the period 2005-2011.

Table 1. Trade of agricultural products (1-24 CT) between Bosnia and Herzegovina and CEFTA 2005-2011

Year	Import (mil. KM)	↓↑ Import (%)	Export (mil KM)	↓↑ Export (%)	Balance (mil KM)	↓↑ Balance (%)	Export-Import Ratio (%)
2005.	851.36	/	154.42	/	-696.93	/	18,14%
2006.	891.81	4.75%	178.75	15.75%	-713.06	2.31%	20,04%
2007.	1,136.61	27.45%	229.10	28.17%	-907.51	27.27%	20,16%
2008.	1,240.00	9.10%	304.38	32.86%	-935.62	3.10%	24,55%
2009.	1,198.00	-3.39%	315.24	3.57%	-882.76	-5.65%	26,31%
2010.	1,281.20	6.94%	361.36	14.63%	-919.84	4.20%	28,20%
2011.	1,344.14	4.91%	446.16	23.47%	-897.98	-2.38%	33,19%

Source: Author's calculations based on data collected by the Agency for Statistics of BaH (http://www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

Note: CT – Customs tariffs, KM – Convertible Marka (BiH national currency).

Next table (Table 2) shows total world foreign trade of agricultural products BaH.

Table 2. Trade in agricultural products (1-24CT) between Bosnia and Herzegovina and the World in the period 2005-2011

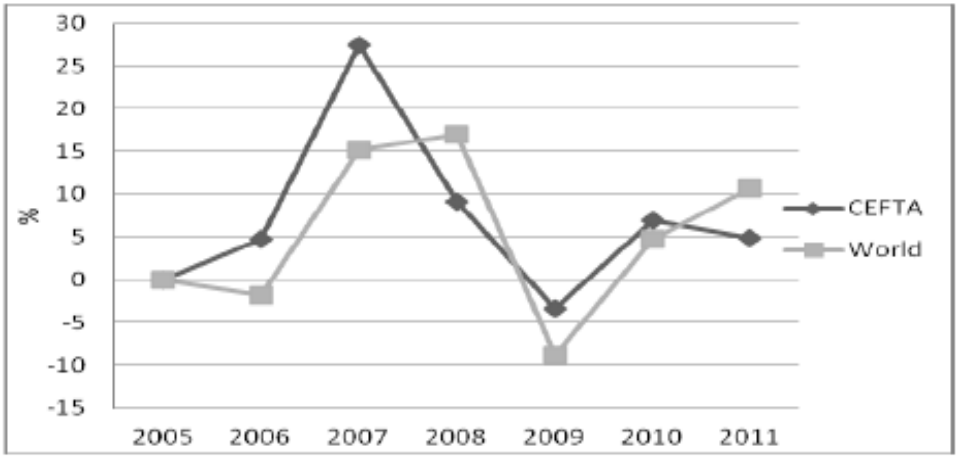
Year	Import (mil. KM)	↓↑ Import (%)	Export (mil KM)	↓↑ Export (%)	Balance (mil KM)	↓↑ Balance (%)	Export-Import Ratio (%)
2005.	1,981.63	/	223.30	/	-1,758.32	/	11.27%
2006.	1,944.94	-1.85%	258.76	15.88%	-1,686.18	-4.10%	13.30%
2007.	2,238.99	15.12%	324.88	25.55%	-1,914.12	13.52%	14.51%
2008.	2,620.15	17.02%	410.10	26.23%	-2,210.05	15.46%	15.65%
2009.	2,389.03	-8.82%	452.77	10.40%	-1,936.26	-12.39%	18.95%
2010.	2,502.40	4.75%	553.08	22.16%	-1,949.32	0.67%	22.10%
2011.	2,769.95	10.69%	612.20	10.69%	-2,157.74	10.69%	22.10%

Source: Author's calculations based on data collected by the Agency for Statistics of BaH (http://www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

Import of agricultural products in Bosnia and Herzegovina from members of CEFTA 2006 (2005-2011)

Import of agricultural products from CEFTA members 2006 to Bosnia and Herzegovina has been constantly increasing since 2005 until 2011 but at lower growth rates compared to the growth rates of agricultural products export from BaH to member countries of CEFTA 2006 for the mentioned period. The exception was in 2009 when the effects of the global economic crisis affected the decline in import of agricultural products from CEFTA 2006 in Bosnia and Herzegovina when there was a decline of 3.39%. From Figure 1 is visible growth rate of agricultural products import in Bosnia and Herzegovina from member countries of the CEFTA 2006.

Figure 1. Annual growth rate of import of agricultural products (in %) in Bosnia and Herzegovina from the CEFTA and the World



Source: Author's calculations based on data collected by the Agency for Statistics of BaH (http://www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

The major increase in import of agricultural products from CEFTA 2006 was recorded in 2007, 27.45% when the CEFTA 2006 Agreement entered into force (for BaH November 22nd 2007). A significant increase in import of agricultural products from the member countries of the CEFTA 2006 during 2007 affected the overall increase in import of agricultural products in BaH which was 15.12% for 2007. The reason for the tight correlation between the increases in import of agricultural products from CEFTA countries with an increase in total import of agricultural products in BIH was the significant participation of CEFTA in total import of agricultural products in BIH, which in 2007 reached a peak of 51%.

For 2008 the rate of increase of agricultural products import from the CEFTA 2006 was reduced to 9.10% while total import of agricultural products in Bosnia and Herzegovina had a growth of 17.02%. The reason for the higher rate of growth of total imports of agricultural products in Bosnia and Herzegovina than the growth rate of imports from CEFTA 2006 was the entry into force of the Interim Stabilisation and Association Agreement with the EU (July 1st 2008) which resulted in an increase in of import of agricultural products from the

EU at the expense of imports from CEFTA members 2006. Therefore, the participation of the member countries of the CEFTA 2006 in total imports of agricultural products in BIH in 2008 was reduced from 51% to 47%.

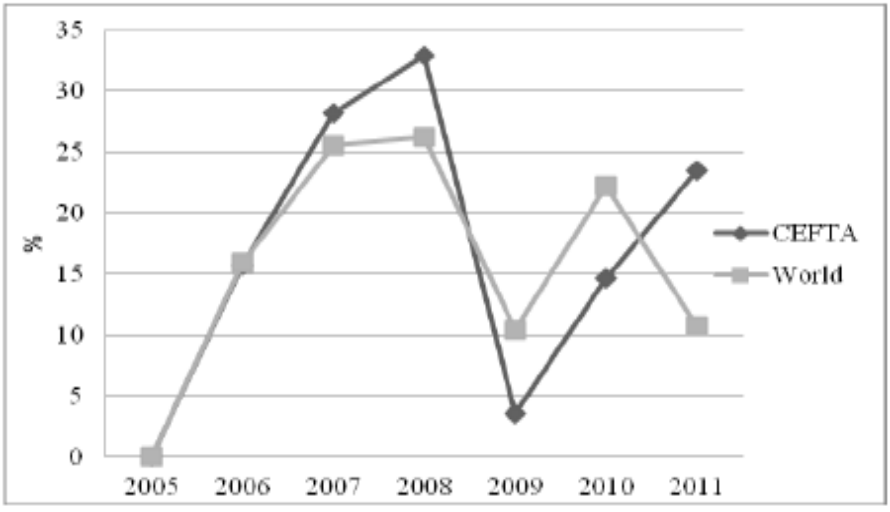
Import of agricultural products from CEFTA members 2006 in 2009 had a decline of 3.39%, as already mentioned, due to the impact of the global economic crisis. Also, the total import of agricultural products in Bosnia and Herzegovina in this year had decline of 8.82%.

In 2010 import of agricultural products from CEFTA members 2006 grew at a rate of 6.94%, while total import of agricultural products this year had a slightly lower rate of 4.75%. In 2011 the situation was reversed and the total import of agricultural products in the Bosnia and Herzegovina had a higher growth rate (10.69%) than the rate of growth of agricultural imports from CEFTA members 2006 (4.91%). The participation of the member countries of the CEFTA 2006 in total import of agricultural products in Bosnia and Herzegovina in the period 2005 to 2011 ranged from 42% in 2005 to 51% in 2007 and 2011.

Export of agricultural products from Bosnia and Herzegovina to CEFTA 2006 (2005-2011)

Export of agricultural products from Bosnia and Herzegovina to 2006 CEFTA member countries is constantly growing in the reference period from 2005 to 2011. This growth was not interrupted nor in 2009 when the effects of the global economic crisis affected the decline in import of agricultural products from CEFTA members 2006 and the World. In Figure 2 is shown growth in export of agricultural products (in %) from BIH to CEFTA 2006 and the World.

Figure 2. Annual growth rates of export of agricultural products (in %) from BIH to CEFTA and the World



Source: Author's calculations based on data collected by the Agency for Statistics of BaH (http://www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

As for import a significant increase in export of agricultural products in member countries OF CEFTA 2006 was recorded in 2007 by 28.17%. Significant growth of export of agricultural products in CEFTA 2006 in 2007 affected the overall growth of export of agricultural products from BaH which in 2007 grew by 25.55%. A significant effect of increasing export of agricultural products in CEFTA 2006 to increase in total export of agricultural products is the result of a dominant share of the member countries of the CEFTA 2006 in total agricultural exports of Bosnia and Herzegovina which in 2007 accounted for 71%. Despite the entry into force of the Interim Agreement on Stabilization and Association Agreement (July 1st 2008) the largest increase of export of agricultural products in CEFTA 2006 was recorded in 2008, while total export of agricultural products from BaH had an increase of 26.23%.

The participation of the member countries of the CEFTA 2006 in total agricultural exports of Bosnia and Herzegovina in 2008 had its maximum of 74%. In 2009, despite the economic downturn, continued to increase of export of agricultural products from BaH in CEFTA 2006, but at a much lower growth rate of only 3.57%, while the total export of agricultural products from BIH grew at a slightly higher rate of 10,40%. In 2010, export of agricultural products in CEFTA 2006 continues to grow at a rate of 14.63%, while the total export of agricultural products this year again had a slightly higher growth rate of 22.16%.

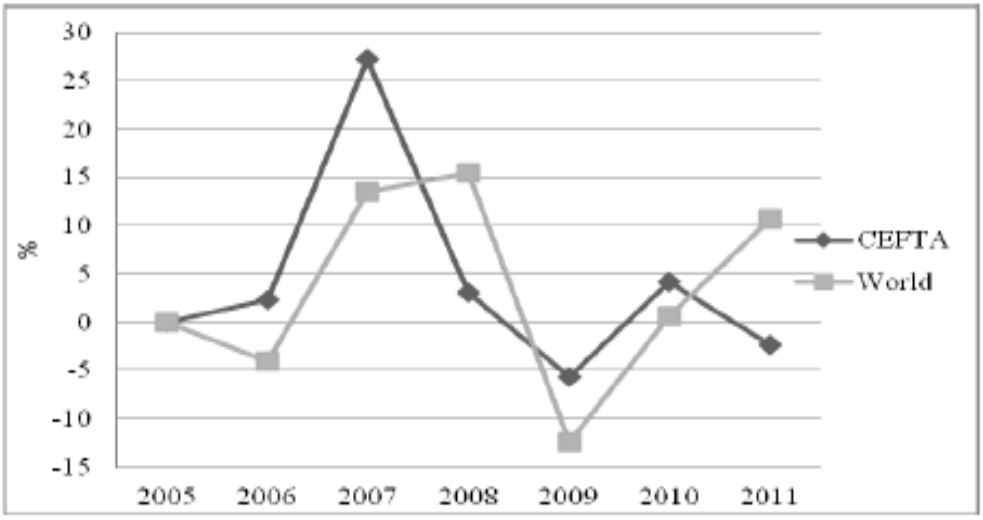
In 2011 the situation was reversed and the rate of growth of export of agricultural products to other countries CEFTA 2006 was 10.69%, but much higher rate of export (23.47%) was recorded in trade with the world. Participation of CEFTA 2006 members in the total export of agricultural products from BaH in the period 2005 to 2011 ranged from 65% in 2010 to 74% in the 2008.

Agricultural products trade deficit between Bosnia and Herzegovina and CEFTA 2006 (2005-2011)

Bosnia and Herzegovina in the period 2005-2011 achieved a negative foreign trade balance or deficit in trade of agricultural products between BaH and CEFTA 2006, but also in the entire BaH agricultural products trade with the World. Bosnia and Herzegovina is a net importer of agricultural products.

In Figure 3 is apparent motion of the growth rate of foreign trade deficit in agricultural trade between BaH and CEFTA 2006 and trade between BaH and the World.

Figure 3. Annual growth rates of the deficit in the trade of agricultural products between BaH-CEFTA and BaH-World (in %)



Source: Author's calculations based on data collected by the Agency for Statistics of BaH (http://www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

Trends in agricultural products foreign trade deficit with CEFTA members 2006 and the world have the same direction but different intensities. The only exception is when it comes to directions of movement deficits in 2011when the deficit with members of CEFTA 2006 had a slight decrease of 2.38% while at the same time the total deficit trade in agricultural products grew by 10.69%.

As Figure 3 shows the largest growth in the deficit in agricultural trade with CEFTA members 2006 was recorded in 2007 (27.27%) when the CEFTA 2006 Agreement entered into force, while in 2008 when the Interim Agreement on Stabilization and Association Agreement entry into force there was an increase in the deficit in trade in agricultural products BaH more than the deficit in trade in agricultural products within CEFTA 2006.

Due to the significantly higher value of import of agricultural products the CEFTA 2006 and the World in relation to the value of export of the same (which shows low coverage of import by export) growth rates and decline of trade deficit in agricultural products BIH are mostly directly related to the movement of agricultural import in BIH, while the impact of export of agricultural products from BIH to the movement of deficits significantly lower. In Table 3 is shown the share of CEFTA 2006 foreign trade with BaH agricultural products.

Table 3. Share of CEFTA 2006 in trade with BaH agricultural products

Year	Share in total Import (%)	Share in total Export (%)	Share in total Deficit (%)
2005	43%	69%	40%
2006	46%	69%	42%
2007	51%	71%	47%
2008	47%	74%	42%
2009	50%	70%	46%
2010	51%	65%	47%
2011	49%	73%	42%

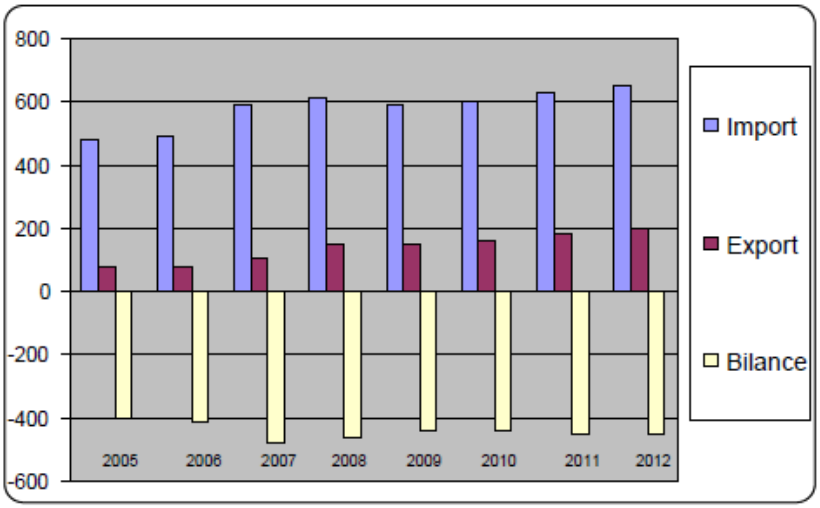
Source: Agency for Statistics of Bosnia and Herzegovina, (edited by authors), (www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

The export-import ratio of agricultural products in BaH trade with CEFTA 2006 in the period from 2005 to 2011 ranged from 18.14% in 2005 to 33.19% in 2011 There is an evident trend of improving the coverage of import by export in that period. Compared to the export-import ratio of total foreign trade BIH agricultural products, export-import ratio within CEFTA 2006 is much more favourable. Export-import ratio of the total foreign trade of BIH agricultural products in the period 2005 - 2011 ranged from 11.27% (2005) to 22.10% (2010 and 2011).

Consequences of Croatian accession to the EU

Bosnia and Herzegovina and Republic of Croatia (RC) have traditionally good trade and economic relations. The Republic of Croatia was the first country that Bosnia and Herzegovina has signed a bilateral agreement on trade liberalization. Naturally after signing the agreement CEFTA trade relations between the two countries are governed by this agreement. Trade Balance (RC-B&H) was on the Croatian side. But for many of BaH agricultural and food products the Republic of Croatia has become a major export market (Ćejvanović and Džafić, 2011).

Figure 4. Foreign trades in agricultural products between Bosnia and Herzegovina and Republic of Croatia



Source: Agency for Statistics of Bosnia and Herzegovina (http://www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

Balance in trade with the Croatia as in the case of balance with other CEFTA countries increased from year to year, of course, for reasons which we have already passed. That's the lowest coverage of import by export was in 2005 while in the other direction was greatest turn in 2012.

Table 4. The coverage of import by export in agricultural products trade between Bosnia and Herzegovina and the Croatia

Year	2005.	2006.	2007.	2008.	2009.	2010.	2011.	2012.
Coverage (%)	18,93	19,74	20,69	25,10	25,82	28,68	30,73	31,13

Source: Agency for Statistics of Bosnia and Herzegovina (http://www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

Republic of Croatia on July 1st 2013 became a full member of the European Union, which closes one chapter of trade cooperation and opens up completely new. As already mentioned trade links between Republic of Croatia and Bosnia and Herzegovina have so far been regulated by CEFTA agreement, however after EU membership this agreement is automatically suspended. Suspending the agreement CEFTA with Republic of Croatia Bosnia and Herzegovina is likely to lose the most important export market for agricultural products worth an average of 150.87 million. It is very difficult for BIH to compensate this loss of market. In such a situation agricultural enterprises will be forced to reduce production or purchase from the family farm and it would be a major blow for domestic agricultural production which will feel the consequences already in the 2014.

Table 5. Export of agricultural products from BaH to Croatia

Year	2005	2006	2007	2008	2009	2010	2011	2012
Export (mil. KM)	86,51	91,45	125,05	157,58	156,35	175,24	201,22	213,53

Source: Agency for Statistics of Bosnia and Herzegovina (http://www.bhas.ba/index.php?option=com_publikacija&view=publikacija_pregled&ids=2&id=7&n=Vanjska%20trgovina).

From agricultural products represented in the structure of export largely participate producers of animal products especially milk and milk products so that the greatest effects can be expected in this sector. In addition to producers of milk and dairy products, we can expect consequences for sectors of the meat (whether it be on unprocessed meat or processed meat) and of plant products in potato sector. All listed products in addition to being the largest volume of exports to Croatia are "critical" because they are still (working conditions of export) cannot be exported to the EU market. Given counted it means BIH can export to Croatia only products that can be exported to the EU market. In BIH such products is only few, especially when it comes to animal products and their processed products.

The table shows that the export from BIH to Croatia ranged from 86.5 up to 213.5 million, which represents the largest export of agricultural products in one country that makes Croatia's major trading partner in agricultural products. With Croatian membership in the EU this export for most of (and most important) products will effectively be stopped because they missed the chance for an agreement before accession Croatia to the EU.

The second and perhaps more important issue is the problem of transit through Croatia and the EU about which are still performed trilateral negotiations between BIH, Croatia and the EU. Since Croatia became a member of the EU it is valid for EU legislation on the movement and transit of animals and products of plant origin. This can represent a serious problem for local exporters because alternative transportation and alternative export routes make export more expensive and therefore it below probably reduced after. The aforementioned problems, although agronomic professions indicated to, are not adequately resolved for political reasons from political positions holders and the tremendous consequences will be felt by BIH agriculture (Bilić et al., 2011).

Conclusion

Member countries of the CEFTA 2006 are the most important trade partner of Bosnia and Herzegovina when it comes to agricultural trade (MOFTER b). So, it is a most important export market for agricultural products from Bosnia and Herzegovina, as evidenced by the participation of the member countries of the CEFTA 2006 in total agricultural exports from Bosnia and Herzegovina in the period 2005-2011 by as much as 74% in 2008 and 73% in 2011.

CEFTA 2006 is the only export market of Bosnia and Herzegovina for products of animal origin in 2011: meat, milk and dairy products, and meat products. Export of agricultural products from Bosnia and Herzegovina in CEFTA 2006 in the period 2005-2011 is constantly growing

with very high growth rates, for example, 32.86% in 2008. This growth was interrupted in 2009 when the effects of the global economic crisis reflected in the decline in total imports agricultural products in Bosnia and Herzegovina. The constant growth of export agricultural products from Bosnia and Herzegovina in CEFTA 2006 had a positive impact on improving the coverage of import by export agricultural products from the CEFTA member states 2006, from 18.14% in 2005 to a record 33.19% in 2011. The export-import ratio is greater than the total coverage of import by export agricultural products of Bosnia and Herzegovina with the world, which is in 2011 amounted to 22.10%.

On the other hand, CEFTA 2006 is the most important importer of agricultural products in Bosnia and Herzegovina with its share in total imports from 42% in 2005 to 51% in 2007 and 2011. Import of agricultural products from the of CEFTA 2006 in Bosnia and Herzegovina has been constantly increasing since 2005 to 2011 but with much lower growth rates compared to the rates of growth of export of agricultural products from BIH in CEFTA 2006 in the mentioned period. The exception is in 2009 when the effects of the global economic crisis affected the decline in import of agricultural products from CEFTA 2006 in BIH.

Bosnia and Herzegovina in the period 2005 - 2011 realized a negative foreign trade balance or deficit in agricultural trade between Bosnia and Herzegovina and CEFTA, and in total trade in agricultural products of Bosnia and Herzegovina with the world. The reason for this is the fact that Bosnia and Herzegovina is a net importer of agricultural products and its production cannot meet their own needs. Trends in deficit agricultural products in BIH trade with CEFTA countries and the world have the same direction, but with different intensities. The total deficit in trade in agricultural products in 2011 grew at a rate of 10.69%, while the deficit with members of CEFTA 2006 has a decrease of 2.38%.

Based on the foregoing, we can conclude that the signing of the CEFTA had a positive effect on the growth of export agricultural products from Bosnia and Herzegovina in CEFTA (**Ćejvanović** and Džafić, 2012) in the reference period 2005-2011 which contributed to the coverage of import by export agricultural products within CEFTA 2006 in the period from 2005 to 2011 almost doubled.

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Review Article

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THE ROLE OF IRRIGATION IN DEVELOPMENT OF AGRICULTURE IN SREM DISTRICT[1]

Branko Mihailović[2], Drago Cvijanović[3], Ivan Milojević[4], Milorad Filipović[5]

Abstract

Applying irrigation get high production results and economics of investments in irrigation systems points out that this measure in agricultural production should be given a priority. By irrigation can stabilize, i.e. increase food production and encourage the development of livestock breeding, processing and other branches of economy in the region of Vojvodina and Srem area. Accordingly, the basic goals of the research are: 1) evaluation of factors of agricultural development with the analysis of impact to the planned construction and exploitation of the irrigation system, 2) market aspects of establishing the irrigation system with water of Srem region, 3) evaluation of market efficiency of agricultural production and 4) defining approach for determination of a new sowing structure under irrigation.

Research has shown that irrigation increases the agricultural production efficiency, there makes impact to sowing structure change, and the market surpluses on the international market can be sold, by using the existing international agreements, signed by the Republic of Serbia. However, besides a great potential in the sector of agricultural production, as the result of favourable climatic conditions, natural land characteristics and available water resources, signed agreements on free trade – the potentials in agro-food sector have not been sufficiently used.

Key words*: irrigation, agricultural development, competitiveness, efficiency.*

JEL: *Q1, Q5*

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2 Branko Mihailović, Ph.D., Scientific Associate, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 69 72 858, E-mail: brankomih@neobee.net

3 Professor Drago Cvijanović, Ph.D., Scientific Adviser, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 69 72 858, E-mail: drago_c@iep.bg.ac.rs

4 Professor Ivan Milojević, Ph.D., University of Defence Belgrade, Military Academy, Pavla Jurišića Šturma Street no. 33, 11000 Belgrade, Serbia, Phone: +381 11 3603 247, E-mail: drimilojevic@gmail.com

5 Professor Milorad Filipović, Ph.D., University in Belgrade, Faculty of Economics, Kamenička Street no. 6, 11000 Belgrade, Serbia, Phone: +381 64 138 09 46, E-mail: miloradf@ekof.bg.ac.rs

Introduction

Started changes in the field of economy, although under the influence of numerous factors which have a depreciation effect, have acquired the character of irreversible processes. Namely, reform of economic system can hardly be back to a starting position, but first of all on its hesitating tempo and instruments of macro-economic policy can be spoken, which often should establish a balance between diametrically opposed economic goals. On the other hand, standard of the population in the Republic of Serbia, measured by *GDP/per capita*, amounts 4,112 EUR, and the main problem of its increase in the following period can be found in inefficient institutions of systems and absence of common infrastructural reforms.

Technological obsolescence of Serbian industry is a serious obstruction in further development of industrial production and achievement of high production standards and quality of final products, which on the developed countries' market are required (ILO, 2010).

According to 154 surveyed enterprises (small, medium and big enterprises) in the whole Serbia, data point out that the average age of machines and equipment in food industry is 27.17 years. In Central Serbia the average age of machines and equipment in food industry is also around 27 years. The situation is slightly better in Vojvodina, since that the average age of machine and equipment of 22 years in food industry has been registered.

The highest gross rate of job creation in the year 2011 had the region of Vojvodina. However, in this region was at the same time realized also the largest outflow of employees, so that apparently important increase of employment has contributed to the rate of newly-created jobs of 2.2 %, which approximately suits to the republic average level (National Employment Service of Serbia, 2012).

According to the same source, the Belgrade region had the lowest gross rates of creation and termination of jobs, so a net rate of jobs creation was amounted 2.07 % in Serbia, or some more than the average net rate of created jobs in the Republic of Serbia.

In the region of Šumadija and West Serbia was rated the highest net rate of job creation, which was amounted 2.25% in the year 2011, and this could be an important indicator of the regional economies revival. However, in the region of South and East Serbia was realized the lowest net rate of jobs creation – 1.59 (ILO, 2010).

It is important to emphasize that agriculture cannot go on employing a number of people currently employed, and to be competitive in the environment instantaneously, and especially on the EU market. Conflict of agriculture role in economic development and its social component characterizes constantly the economic structure of Serbia, and precise demarcation of development-oriented agricultural husbandries which belong in the domain of social and rural policy of a state – are necessary for defining clear directives of construction of a competitive agro-food sector in the future.

The most important elements of the reform processes in the agrarian sector of Serbia since 2000 until today have been: market liberalization, privatization of processing industry, activation of agrarian financial market, as well as forming new institutional forms at all levels. In the following period Serbia should become a member of WTO and to apply fully the accepted rules, which mean significantly reduction of import protection, elimination of export subsidies and change of internal support structure to the domestic agricultural production.

Assumptions based on a stationary climate may no longer be tenable (Milly et al., 2008). Namely, observing climatic changes, primarily air temperature and precipitation (their amounts and disposition during the whole hydrological year and during the vegetation period), globally in the following years the intensive climatic changes will be expected. Those changes will mostly reflect to increase of air temperature and decrease of precipitations, which can cause the existence of droughts, as extreme manifestations.

Also, analysis of basic climatic data revealed that the dry years were more common in the period after 1981 (Rajic et al., 2010). The global water crisis has drawn worldwide attention to the urgency of achieving a more efficient use of water resources, particularly in agriculture, to increase crop production and achieve world food security (Dabour, 2002).

Current situation in irrigation in our country observed through total number of irrigation systems, or surface area on which they were built, is not satisfactory neither considering range, nor considering technical equipment and the level of use (Potkonjak and Mackic, 2010). Irrigation, being one of ameliorating measures, is certainly most successful way of fighting against drought because it controls soil water balance, which creates favourable conditions for high, stable and economically justified plant production (Kljajic et al., 2013).

Due to the worldwide accepted belief that water is the most important strategic resource XXI century, the management of water resources and management systems for water use and protection is gaining importance (Cecić et al., 2007). Advantages of irrigation are the following: more rational use of natural resources, first of all the use of soil; reduced or eliminated risk from droughts; relation soil-water-plant in accordance at higher rate; higher income per capacity unit; production is economically more efficient; reaching better living standard and higher income of the employees and similar (Sredojevic et al., 2006).

However, it basic use is to apply water to the land aiming to achieve optimal growth and development of cultivated plants when during vegetation there is not sufficient amount of water (Kljajić et al., 2011).

According to the Law on Water of the Republic of Serbia (Official Gazette of Republic of Serbia, no. 30/10), in Serbia a legal status of waters, integral management of waters, management of water facilities and water land, sources and method of funding water activity and other issues significant for managing waters have been arranged. The Republic of Serbia is a downstream country for most of neighbouring countries, while a dominant part of water courses on our territory has the international character.

Taking it into consideration, Serbia has ratified the Convention on Protection and use of Trans-boundary Water Courses and International Lakes (Official Gazette of Republic of Serbia – International contracts, no. 1/10) and from November 2010 Serbia has become the Convention party.

Significance of the convention on waters for management of water resources on the territory of Serbia can perceive through three fields: water use, protection of waters and protection of waters quality, and generally it has a goal to impel modernization of water resources management system. Traditionally, the efficiency in water use has been looked upon from a technical point of view (Omezzine and Zaibet, 1998).

Methodology and data sources

In accordance to the state analysis of irrigation, aiming to increase its development, revitalization should be carried out in several phases:

- Capacitate the existing irrigation systems,
- Complete reconstruction of existing irrigation systems, including their enlargement and upgrade (increase of irrigated areas), where it is possible to perform,
- Building new irrigation systems.

Accordingly, the basic goals of the research are:

- Evaluation of factors of agricultural development with the analysis of impact to the planned construction and exploitation of the irrigation system,
- Market aspects of establishing the irrigation system with water of Srem region,
- Evaluation of market efficiency of agricultural production,
- Defining approach for determination of a new sowing structure under irrigation.

In realization of the research task, which refers to the state and tendencies in the regional system of water supply of Srem, the following method of market research will use: Secondary data Analysis or predominantly "Census of Agriculture", 2012.

Aiming to realize the research task all available sources of informing will be used:

- Census of Agriculture, 2012,
- Survey of Employers, 2012,
- Official Gazette of Republic of Serbia,
- Researches of domestic and foreign authors in the thematic field.

Results with Discussion

Agriculture is one of the pillars of the Republic of Serbia economic development, and its significance for the national economy besides economic has a social and an ecological component, too.

A basic characteristic of changes in agrarian structure of Serbia during transition is that they had realized on relation of conversion the state/social ownership into the private (investors were buying great properties with supporting infrastructure, mechanization and facilities), while conveyance of landed properties between private owners was not expressed (private property had not been an object of more significant transactions in which big, external capital, accumulated outside agriculture, would participate).

At this point the review of basic parameters which have a decisive effect or which can affect to the courses of agriculture development (whether positive or negative) in the Republic of Serbia and Srem area will be given.

Factors of positive impact to the courses of agricultural development. The most important factors of positive influence are listed below:

- Favourable natural resources (location, land). The Republic of Serbia has favourable natural conditions for development of diverse agricultural production, since it is located on the most favourable area of northern latitude. Together with climate, land represents the most significant condition for development and assignment of agriculture. In accordance with the SORS (Municipalities and regions in the Republic of Serbia, 2013) agricultural land makes 65.6% of the Serbian territory. According to data of Census of Agriculture 2012, the Republic of Serbia disposes with 5,346,597 ha of land (agricultural, forest, other land), i.e. with 3,437,423 ha of used agricultural land (0.48 ha of used agricultural land per capita). Even 73% of used agricultural land are plough land and gardens (2,513,154 ha),
- As for water resources, the Republic of Serbia disposes with sufficient amounts of water for satisfaction of its needs, but only if it uses them rationally and protects from accidental or deliberate pollution. Significant wealth represents mineral and thermo-mineral waters, which diversity of physical and chemical characteristics classify our country into the line of the richest areas on the European continent,
- By numerous agreements on free trade (especially CEFTA agreement, the preferential export to the EU market, Free Trade Agreement with the Russian Federation, Generalized System of Preferences with USA), the Republic of Serbia has created the favourable conditions for foreign trade with commodities in the field of agro-food sector. These agreements provide opportunities to domestic producers and exporters to overcome the problem of small market and increase utilization of capacities on the market several times larger than the domestic one, along with realization of price competitiveness and increase quality of products. Objectively, Serbia has great chances to be the leader in agro-food sector on the territory of South-East Europe (export within the CEFTA agreement) and the sector of agriculture has already paved the way toward the European Union market, because almost half of the total export has been directed to the EU market and it has realized a significant surplus in exchange (preferential export of agricultural products on the EU market). The free trade agreement with the Russian Federation provides higher export of Serbian products on the Russian market, and at the same time is one of the greatest

assets that Serbia has in attracting foreign investments. Preferential export of agro-food products from Serbia to the Russian Federation market (which enables initially the price competition) and higher export of food onto this market can contribute to decrease of trade deficit which Serbia has with Russia and could also help to Serbian producers, especially meat, milk and fruit producers and processors, to achieve the economy of scale through higher export orders, full utilization of capacities and higher foreign exchange incomes. All advantages of free trade with the Russian Federation and other member-countries of the Customs Union (Byelorussia and Kazakhstan) Serbia should take until it accesses the EU, because after that the signed agreements on free trade will no longer be in force,

- Construction and level of technical-technological equipment of food industry has not been mostly a limiting factor of agricultural production increase, but it significantly differs observed by sectors. Certain number of enterprises is at the top of technical-technological equipment and they dispose with highly educated personnel, while other enterprises lack behind the modern technological and marketing requests. Since the beginning of privatization process, the most has been invested in industry of oil, beer, milk, confectionery and industry for water processing, while on the other hand, less investments and less technological equipment has been registered in industry for processing of sugar, meat, fruits and vegetables,

Factors of negative impact to the courses of agricultural development:

- Most of arable land is acidified, as the result of uncontrolled use of chemicals, and in Vojvodina it is saline. Accordingly, there are necessary agro-technical measures aiming to improve land structure – calcification, greater use of organic fertilizers, et.
- Water regime, although unfavourable, has been insufficiently used. River courses use insufficiently for irrigation. In accordance to Census of Agriculture 2012, the irrigated area on properties of agricultural husbandries (family agricultural husbandries, legal entities and entrepreneurs) is 99,773 ha (2.9% of used area). Consequentially, agricultural production depends on precipitations, which are unevenly timely and spatially distributed, depending on atmospheric processes and relief characteristics,
- Ownership structure of agricultural land makes small and fragmentized agricultural holding (used agricultural land per an agricultural husbandry is 5.44 ha). The census of agriculture in 2012 showed that the average size of totally used land per an agricultural husbandry in Srem amounts 7.82 ha, and even 70.1% of husbandries have land up to 5 ha. The highest share is of husbandries which use land up to 1 ha, 34.26% of them. The biggest average used agricultural land in Srem area is in Inđija (9.18 ha), Stara Pazova (8.27 ha), Sid (8.04 ha), etc.
- There is relatively low utilization of food industry capacities (level of capacities utilization, projected for ex-YU market, ranges from 30-50%). The highest level of utilization is regarding the capacities for mineral water production, oil factories, mills, capacities for processing of fruits and vegetables, for production of confectionery

products, breweries, dairies and sugar factories. The lowest level of utilization is regarding the capacities for fodder processing and abattoirs, which causes inefficiency in business and poor competitiveness of this sector,

- Basic limiting factors for more efficient inclusion of food industry onto the international market is as follows: a) insufficient assortment of food products in regard to supply in developed world (insufficiently wide assortment of the existing products, small number of introduction of completely new products and processes, low level of adding value to products through increased role of knowledge, innovations, etc.), b) Vacillating of quality of market products, whether due to lack of standards, or due to disrespect and poor control of the current standards, c) Absence of long-term and firm contractual relations or proprietary connection between food industry and raw materials producers (primary agricultural production),
- Trade liberalization and decrease of customs protection (within the WTO and the Stabilization and Accession Agreement),
- Low competitiveness and innovation of agricultural producers in Serbia. It is necessary to involve small producers in a modern market chain, because they are insufficiently competitive, they trade in informal channels, and their cost of standards introduction is high,
- The current size and structure of agricultural production, its high extensiveness and oscillatory, and low productivity, along with inefficient organization of production-trade flows and inefficient strategies of all types of agro-subjects which do not respect enough the signals of market – are the basic factors which limit achievement of price competitiveness of the domestic producers on the market of agro-food products. Accordingly, it is necessary to reconsider the existing and development of new business and marketing strategies of agricultural producers, based on developmental abilities and power of the producers, but also based on knowing consumers preferences, new technologies, marketing approaches and other modern market postulates of economy,
- Unattractiveness of the primary agriculture and food industry fields for bigger investments, owing to non-established institutions, unfavourable/un motivating business environment, high investment and political risk, high price of capital and many other factors, i.e. the existence of numerous costs,
- Changes in requirements of buyers, their demand or habits cause also changes in functioning of market chains. It is expected these changes to be more expressed in time of the global crisis (Živkov et al., 2009). According to the same source, due to decreased demand on some markets, producers can adjust their production to new requirements; traders must find new markets and adjust to new conditions of sale with much delay in payment, or find new points of sale or new sources of funding.

Natural conditions and production possibilities of Srem area, within which the production realization is planned should use and develop to the utmost, primarily by measures whose

direct impact will be in function of production and which effects will directly result its size and quality.

By changing the production character, its purposeful decidedness for export, makes the necessary conditions for its more favourable social treatment and its acceptance in sense of a significant factor of economic stabilization and evident and potential source of a significant foreign exchange inflow.

Accordingly there must set up the market mechanisms by which provide technological and production-economic correlation of all participants in production to the final consumption market. Also, irrigation and drainage will be more site-specific and much more closely linked with policies and plans in agriculture and other sectors (Svendsen and Turral, 2007). Analyses have shown that trade reforms combined with institutional reform in the water sector, such as water pricing reforms, or promotion of water market, could prove to be more welfare increasing (Diao and Roe, 2000).

Currently in the Republic of Serbia water for irrigation can be used from almost all sources, but with caution and permanent control (Kljajić, 2014). Crop production is concentrated in the lowlands of the Vojvodina province in the northern part of Serbia, with variable, unstable and unpredictable rainy and dry periods between June and August (Božić et al., 2007).

According to the census of agriculture in 2012, 58,251 ha of agricultural areas were irrigated on the territory of AP Vojvodina, or duplicated in comparison to the year 2010. On the territory of AP Vojvodina, according to data for the year 2010, irrigation was applied for 26,877.50 ha of agricultural areas (Public Water Management Company "Vode Vojvodine", 2010). The most important sources of water for irrigation (Table 1) are ground waters on a husbandry (44.9%) and surface waters outside a husbandry (40.2%).

Main sources of water for irrigation in Vojvodina, observed by areas, are:

1. West-Backa area – ground waters on a husbandry (51.3%),
2. South-Banat area – surface waters outside a husbandry (52.8%),
3. South-Backa area – ground waters on a husbandry (56.2%),
4. North-Banat area - surface waters outside a husbandry (52.3%),
5. North-Backa area – ground waters on a husbandry (70.2%),
6. Mid-Banat area - surface waters outside a husbandry (63.7%),
7. Srem area - ground waters on a husbandry (49.0%).

Table 1. Methods of irrigation and main sources of water for irrigation in Vojvodina

Region Area City-municipality	Methods of irrigation			Main sources of water for irrigation				
	Surface irrigation	Sprinkling irrigation	Drop irrigation	Ground water on husbandry	Surface waters on husbandry	Surface water outside husbandry	Tap water	Other sources
Vojvodina region	38.7	25.0	36.2	44.9	5.2	40.2	5.1	4.6
West-Backa area	34.4	20.6	44.9	51.3	5.5	30.9	4.2	8.1
South-Banat area	43.9	17.8	38.3	30.0	7.0	52.8	7.9	2.4
South-Backa area	37.7	33.1	29.2	56.2	5.7	30.9	3.5	3.6
North-Banat area	48.7	31.8	19.5	37.5	2.8	52.3	5.2	2.2
North-Backa area	30.4	28.7	41.0	70.2	2.9	17.7	6.3	2.9
Mid-Banat area	36.8	21.8	41.4	22.8	3.3	63.7	4.4	5.8
Srem area	37.4	18.3	44.3	49.0	5.9	33.8	5.3	5.9

Source: Census of Agriculture - 2012.

In the area of Srem are irrigated 3,655 ha of land in total. The irrigated land of Srem area according to the categories of use: plough land and gardens 2,484 ha, orchards 1,152 ha, vineyards 11 ha, meadows and pastures 3 ha and other perennial plantations 5 ha (Table 2).

Table 2. Irrigated land according to categories of use in agricultural 2011/2012

Region - City -municipality	Irrigated land		Plough land and gardens		Orchards		Vineyards		Meadows and pastures		Other perennial plantations	
	PG	ha	PG	ha	PG	ha	PG	ha	PG	ha	PG	ha
Srem area	1,378	3,655	1,147	2,484	248	1,152	19	11	2	3	5	5
Indjija	75	138	47	76	28	55	6	5	-	-	2	3
Irig	33	352	14	33	17	316	3	3	-	-	-	-
Pecinci	174	378	152	242	24	135	1	1	-	-	-	-
Ruma	508	1,108	446	968	73	136	1	0	1	2	1	1
Sremska Mitrovica	438	941	397	892	46	48	5	2	1	0	-	-
Stara Pazova	79	231	63	190	17	40	2	1	-	-	-	-
Šid	71	507	28	83	43	422	1	0	-	-	2	2

Source: Census of Agriculture - 2012.

Of totally irrigated land in Srem the largest irrigated area is in Ruma (1,108 ha), then Sremska Mitrovica (941 ha) Sid (507 ha) etc. The smallest irrigated area is registered in Inđija (138 ha). If the percentage of the total irrigated areas under crops (plough land and gardens) analyses there can see that the best coverage is regarding vegetables, melons and strawberries (in open field), 49.2%. Sugar beet follows with 2.9%; other crops on plough land and gardens (1.2%); cereals and maize for silage (0.4%), and finally sunflowers with

only 0.1%, which irrigates of the total area under this crop (Census of Agriculture, 2012). The most common way for irrigation in Srem is drop irrigation (44.3%). Also is significant surface irrigation (37.4%), while sprinkling irrigation is rarest (18.3%). The main sources of water for irrigation in Srem are: ground waters on a husbandry – 49.0%; surface water on a husbandry – 5.9%; surface waters outside a husbandry – 33.8%; tap water – 5.3% and other sources – 5.9% (Table 3).

Table 3. Methods of irrigation and main sources of water for irrigation in Srem

Region – city - municipality	Methods of irrigation			Main sources of water for irrigation				
	Surface irrigation	Sprinkling irrigation	Drop irrigation	Ground waters on husbandry	Surface waters on husbandry	Surface water outside husbandry	tap water	other sources
Srem area	37.4	18.3	44.3	49.0	5.9	33.8	5.3	5.9
Indjija	39.2	16.9	43.9	38.0	9.4	43.0	7.0	2.6
Irig	38.3	17.0	44.7	34.0	6.9	26.2	23.2	9.7
Pecinci	19.6	11.1	69.3	65.2	6.8	22.2	1.1	4.7
Ruma	25.8	23.2	51.1	43.1	8.0	39.5	3.3	6.1
Sremska Mitrovica	60.0	17.6	22.5	57.9	3.3	31.2	2.8	4.8
Stara Pazova	44.7	19.1	36.2	37.1	4.7	36.2	8.8	13.2
Šid	31.8	10.9	27.3	40.3	9.1	40.7	7.2	2.7

Source: Census of Agriculture - 2012.

In domestic agro ecological conditions, it is possible to realize various production and economic effects of irrigated crops (Potkonjak and Mackic, 2010). Taking into consideration the current state of irrigation system in Vojvodina and Srem area and a need for provision of sufficient amounts of water to crops during the vegetation period, it is necessary to revitalize the irrigation system, in order to raise it to the European level and improve agricultural production by its apply.

Irrigation has a large impact on yield production and intensification of agricultural production (Babović et al., 2009). Namely, by irrigation increases the agricultural production efficiency, there makes impact to sowing structure change, and the market surpluses on the international market can be sold, by using the existing international agreements, signed by the Republic of Serbia. However, besides a great potential in the sector of agricultural production, as the result of favourable climatic conditions, natural land characteristics and available water resources, signed agreements on free trade – the potentials in agro-food sector have not been sufficiently used.

The largest area of agricultural land in Serbia is used for production of cereals and this production occupies around 60% of total plough land and gardens. Maize is the most common crop with over 1.2 million of seeded acres, while wheat is right behind with around half million acres. Due to large sown areas, among sectors with the highest value of primary production are cereals, which additionally increase with further processing. Cereals production satisfies the needs of the domestic processing industry and certain

amounts export. Thanks to favourable trends regarding prices of cereals on the international market, which were reaching their maximum during 2008 and 2011 there was noticeable the trend of cereals production increase, in past several years, thanks to maize, while wheat and barley were stagnated and the production decreased in Vojvodina (Živkov et al., 2012). In Srem area under cereals is 147.058 ha (Table 4).

Table 4. Areas under grains in Srem area

Region - city -municipality	Number of agricultural husbandries	Grains, ha						
		Total	Wheat and spelt	Rye	Barley	Oat	Maize	Other cereals for grains
Srem area	21,233	147,058	54,928	71	3,775	154	86,810	1,320
Indjija	2,332	19,011	6,786	2	161	44	11,958	61
Irig	1,176	7,039	2,971	-	83	21	3,864	100
Pećinci	2,497	18,036	8,420	11	1,063	15	8,235	292
Ruma	3,856	28,540	11,063	4	578	9	16,651	236
Sremska Mitrovica	5,812	35,755	13,284	14	675	35	21,432	315
Stara Pazova	2,411	20,335	6,076	6	378	23	13,166	186
Šid	3,149	18,342	6,329	35	338	7	11,504	129

Source: Census of Agriculture - 2012.

Table 5 shows competitiveness of individual products, expressed through the average ratings of two parameters: production and export. The average ratings calculated according to evaluation of: a) significance of size and increase of production, and b) value and increase of export in regard to the competitive countries (Živkov et al., 2012). In this way can see clearly which products have export potential, but they are insufficiently present in production in Vojvodina, and which production should re-orientate to the one with greater potential.

New sowing structure under irrigation should respect ranking the competitiveness of individual products according to evaluations of significance of production and export (Table 5). In this context, it is important to point out the following (Živkov et al., 2012):

- Maize and industrial plants have good competitive position, along with carrot, because shares of production and value of export of these products are very significant, i.e. the average annual growth rates of production and export are significantly higher in regard to competitors,
- In principle, fruits have a good position concerning production and export,
- Situation regarding vegetables varies from product to product,
- Concerning cereals, the worse position has barley, owing to the value and the growth rate of this product's export, while vegetable worst position has potatoes.

Table 5. Calculation and ranking of single products competitiveness according to evaluation of significance of production and export, region of AP Vojvodina

Product	Average rating of production and export	Evaluation of significance for rural development
Wheat	3.13	5.00
Barley	1.93	2.00
Maize	3.87	5.00
Soy	3.77	3.00
Potato	1.88	4.00
Apple	2.88	4.00
Plum	3.15	3.00
Pear	3.03	1.00
Sour cherry	3.85	1.00
Peach	2.78	1.00
Pepper	2.15	4.00
Onion	3.02	4.00
Tomato	2.55	4.00
Cucumber	2.42	3.00
Carrot	4.25	3.00
Milk	2.12	5.00
Beef	2.30	4.00
Pork	2.68	5.00
Mutton	2.73	2.00
Sugar beet and sugar	4.05	2.00
Sunflower and oil	3.10	3.00

Source: Živkov et al., 2012. *Note:* The obtained values were evaluated from 1 to 5, in a way that a product with the highest share or the highest growth rate of production in regard to the competitive got 5, and the one with the lowest got 1. In accordance to the production and export evaluation was calculated the average rating of products competitiveness, as a unique value which determines position and potential of the specific product in regard to others.

Expected yields in irrigation systems are higher than production in terms without irrigation for around 30%, but also up to 100% in years with unfavourable distribution of rainfall, i.e. longer dry periods. Consequently, safety of production can be largely guaranteed (if all the rest conditions of good agricultural practice are satisfied) in production terms of irrigation. On average, the efficiency and influence of irrigation on increase of crop yields in practice and experiments amount from 30% to 50% regarding potato, from 50% to 100% higher yield of onion, from 20% to 50% higher yield of seed maize and sugar beet, the yield of pepper is higher from 40% to 60% and apple from 30% to 40% (Cvijanović et al., 2012). Effects of irrigation on the value of crop production and reimbursement margin of variable costs, as in cereals production, as well as in production of industrial plants, are expressed through increase of incomes and the reimbursement margin.

Conclusion

Taking into consideration the current state of irrigation system in the Republic of Serbia and Srem region and a need for providing sufficient amount of water to crops during the vegetation period, it is necessary to make revitalization of the irrigation system, in order to raise it to the European level and improve the agricultural production by its apply. Increasing lack of water resources, their irrational consumption and insufficient protection, along with unfavourable consequences of climatic changes, represent limiting factors of economic development in many regions of the world, among which is also the region of South-East Europe. These are the problems the Republic of Serbia faces with. Generally, in the Republic of Serbia, which has been characterized by the changeable climatic conditions, where precipitations by their amounts and disposition, vary from year to year, irrigation has been a significant factor of increase and stabilization of agricultural production. Analyses show that droughts in the Republic of Serbia appear every third to fifth year in average, and culmination was in the year 2000 when long-term drought had the character of natural disaster and it had significantly diminished agricultural production, which had left very serious trace to the entire national economy, too. According to the carried out research can draw the following conclusions in the context of irrigation:

- Most of crops and forage crops are not payable for irrigation and for that reason should be careful while making decisions which of the mentioned crops and for what purpose should be produced. Success of irrigation requires knowing specificities of specific plant species and their genotypes. In the sowing structure to a greater extent some of industrial plants can be represented in irrigation, and which reacts well on irrigation. Some of potentially interesting crops and forage crops in terms of irrigation can be: a) seed production of maize, b) mercantile maize and soy production, c) seed production (sugar beet, soy), d) mercantile production (sugar beet, sunflower and tobacco), e) plants as second crop or for double-cropping sowing, by which accomplish "second sowing" in a production year. For example, maize in irrigation conditions tolerates postponing of sowing period, which enables production of winter crops of inter-seasonal sowing for green fodder. Furthermore, prolongation of sowing enables performing other spring works.
- Vegetable production cannot imagine without provision of sufficient amounts of water for irrigation. Fruit and vegetable production have the largest irrigated areas. All vegetable plants require a higher level of soil moisture in comparison with crops, owing to less developed root system in regard to above-ground system which uses large amounts of water. Nevertheless vegetable plants contain large amount of water in tissue. All of these things complicate irrigation a lot and it requires daily tracking of relative soil moisture, because a deficit leads to decrease of yields, while increased content leads to occurrence of disease and violation of water-air regime vegetable plants are very sensitive to.
- Fruit growing and vine growing. Irrigation of orchards and vineyards contributes to high yields and stable production of high quality. Most of fruit trees react well to irrigation by increasing yields and quality of fruits, as well grapevine. Mostly used ways of irrigation in fruit and wine growing are "drop" irrigation systems.

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ULOGA NAVODNJAVANJA U RAZVOJU POLJOPRIVREDE SREMSKOG OKRUGA

Branko Mihailović[6], Drago Cvijanović[7], Ivan Milojević[8], Milorad Filipović[9]

Sažetak

Primenom navodnjavanja se dobijaju visoki proizvodni rezultati, a ekonomičnost ulaganja u irigacione sisteme ukazuje da ovoj meri u poljoprivrednoj proizvodnji treba dati prioritet. Navodnjavanjem se može stabilizovati, odnosno uvećati proizvodnja hrane i podstaći razvoj stočarstva, prerađivačkih i drugih grana privrede u regionu Vojvodine i oblasti Srema. Shodno tome, osnovni ciljevi istraživanja su: 1) ocena faktora poljoprivrednog razvoja sa analizom uticaja na planiranu izgradnju i eksploataciju sistema za navodnjavanje; 2) tržišni aspekti uspostavljanja sistema snabdevanja vodom regiona Srem; 3) ocena tržišne efikasnosti poljoprivredne proizvodnje i 4) definisanje pristupa za određivanje nove setvene strukture pod navodnjavanjem.

Istraživanje je pokazalo da se navodnjavanjem povećava efikasnost poljoprivredne proizvodnje, utiče se na promenu setvene strukture, a tržišni viškovi se mogu plasirati na međunarodno tržište iskorišćavanjem postojećih međunarodnih sporazuma koje je potpisala Republika Srbija. Međutim, i pored velikog potencijala u sektoru poljoprivredne proizvodnje koji je rezultat povoljnih klimatskih uslova, prirodnih karakteristika zemljišta i raspoloživih vodnih resursa, potpisanih sporazuma o slobodnoj trgovini – potencijali u poljoprivredno prehrambenom sektoru nisu iskorišćeni.

Ključne reči: *navodnjavanje, poljoprivredni razvoj, konkurentnost, efikasnost.*

6 Dr Branko Mihailović, naučni saradnik, Institut za ekonomiku poljoprivrede, Volgina 15, 11060 Beograd, Srbija, Telefon: +381 11 69 72 858, E-mail: brankomih@neobee.net

7 Prof. dr Drago Cvijanović, naučni savetnik, Institut za ekonomiku poljoprivrede, Volgina 15, 11060 Beograd, Srbija, Telefon: +381 11 69 72 858, E-mail: drago_c@iep.bg.ac.rs

8 Prof. dr Ivan Milojević, Vojna akademija, Univerzitet odbrane, Pavla Jurišića Šturma 33, 11000 Beograd, Srbija, Telefon: +381 11 3603 247, E-mail: drimilojevic@gmail.com

9 Prof. dr Milorad Filipović, Univerzitet u Beogradu, Ekonomski fakultet, Kamenička 6, 11000 Beograd, Srbija, Telefon: +381 64 138 09 46, E-mail: miloradf@ekof.bg.ac.rs

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STRATEGIC COST MANAGEMENT AS INSTRUMENT FOR IMPROVING COMPETITIVENESS OF AGRIBUSINESS COMPLEX[1]

Bojan Savić[2], Zorica Vasiljević[3], Dragan Đorđević[4]

Summary

Cost accounting as a segment of an integrated accounting information system by generation of the relevant information provides significant support for both financial and managerial accounting. The above information represents the information base for decision making of internal and external users (management, investors, creditors and other stakeholders). In this paper a special attention is paid to contemporary systems of cost accounting, the application of which can be seen as an integral part of the effort undertaken in order to measure and control costs, since cost management is one of the indispensable elements to achieve, maintain and improve the competitiveness of enterprises. Having in mind the significant potential the Republic of Serbia has in the field of agricultural production, the aim of this paper is to highlight the challenges and specifics of cost management in the agribusiness complex enterprises. Hence, this paper discusses the modern systems of cost accounting as well as the cost management methods suited to the specific agricultural management activities, which could help to the local companies in efforts for share in the global agri-food products' market.

Key words: *cost accounting, cost management, ecological costs, agribusiness complex, competitiveness.*

JEL: *M41, Q13, Q56*

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2 Bojan Savić, Ph.D., Teaching Assistant, University of Belgrade, Faculty of Agriculture, Nemanjina Street no. 6, 11080 Zemun, Serbia, Phone: +381 11 26 15 315/ext. 211, E-mail: bsavic@agrif.bg.ac.rs

3 Zorica Vasiljević, Ph.D., Full Professor, University of Belgrade, Faculty of Agriculture, Nemanjina Street no. 6, 11080 Zemun, Serbia, Phone: +381 11 26 15 315/ext. 412, E-mail: vazor@agrif.bg.ac.rs

4 Dragan Đorđević, M.Sc., Ph.D. student, Business Academy in Novi Sad, Faculty of Engineering Management and Economics, Čučuk Stanina Street no. 5, 11000 Belgrade, Serbia, Phone: +381 63 48 40 00, E-mail: dragan.doca@gmail.com

Introduction

The contemporary business conditions have been characterized by intensive dynamics of changes as well as the growing competition in the global market. Many companies all over the world are ready to participate in the race for customers. This is among other things due to the quality of their products, the optimal delivery deadlines, product innovation and low operating costs. Although the costs are only one of the elements, they are of the key importance. This is because any inefficiency in business has its reflex in the costs. Also, all efforts to improve the quality and innovation of the product, the delivery, the development of sales channels etc. have been reflected onto the costs. This fact suggests that the costs represent a kind of double-edged sword - on the one hand, the high costs cause the price non-competitiveness of the product, if the costs tend to be shifted to the customers through the selling prices, while on the other side, the costs above the optimal level are followed by inability of their coverage from the operation revenues and, consequently, by the emergence of loss in the income statement.

The above-mentioned statement clearly shows the importance of one of the key strategies for gaining the competitive advantage of an enterprise - the strategy of leadership in costs. It is identified as the ability of the company to produce its products and distributes them to the customers at costs that are lower than those of the competing companies.

Successful cost management primarily requires the precise cost measurement. It is often repeated in business circles the following sentence: "That which cannot be measured, cannot be controlled". For the measurement of costs it is competent the cost accounting, which uses different techniques or cost accounting systems in the long period of time. Conventional cost accounting, which includes a system of calculation based on the actual costs, the system of standard costing and accounting system of the standard variable costs, had its untouchable place and importance in conditions where the human labour has dominated in the production process in relation to the mechanical work, i.e. when labour costs had a significant share in the total cost structure. Although this approach is suitable for the purposes of external financial reporting, information obtained on the basis of traditional costing systems are not suitable for managing the challenges faced by modern enterprises.

The solutions could be certainly found in the modern cost accounting systems that eliminate the weaknesses of the conventional system and provide more precise information. Just precise cost accounting and adequate system of cost management are important determinants of the enterprise cost-efficiency, and thus the factors that determine a long-term success of the enterprise. This is in the sense that the generated cost information are the basis for decision-making of numerous business decisions – e.g. the business planning for the upcoming periods, the control of current operations, an identification of all inefficiencies and deviations from the defined standards, as well as the corrective actions taking over. Through proper identification and measurement of costs, an enterprise will be able to manage the costs. Effective cost management is a source of the superior competitive advantage of an enterprise.

Methodology and Data Sources

The aim of this paper is to analyse the importance and range of the modern costing systems' information support to the management of the agribusiness enterprises in their efforts to achieve a sustainable competitive advantage.

In the paper it has been used a set of different methodological tools that best fit the character of the analysis given of the title topic. In the process of reviewing and analysing the strategic cost management items and in interpretation of the costing systems as an information base for the efficiency decision making process, there have been applied the scientific research methods usual for this type of work, such as the method of description, methods of analysis and synthesis, systematization method, the method of comparison, the inductive method of reasoning, as well as the desk research method. The contribution of this paper is reflected in the review and analysis of new approaches and methods for cost accounting which are not much used in practice of agribusiness companies nowadays, but could be used as the possible choices for the more adequate cost accounting in the future and as the basis for decision making process aiming at minimization of the costs. The sources of literature used for this research were the domestic and foreign scientific literature from the domain of the considered issues, as well as the data sources available on the Internet websites.

The Importance of Competitiveness for the Long-term Success of the Agribusiness Complex

The complex business conditions, the presence of global competition and limited resource require from the enterprise to find a way to conduct its business much more efficiently than other companies, i.e. that it makes with the lower costs. It is no longer a matter of choice, but a condition for survival of the enterprise. The search for sources of core competence is in the basis of these efforts. The essence of competence must be defined in relation to the enterprise customers. So, the goal is to create and deliver a greater value to the customers with identical costs as the ones of the competitive enterprises, or to create and deliver an identical value to the customers at the lower costs. Under the value for the customers it has to be understood all the tangible and intangible benefits that customers enjoy on the basis of use of the product. Previous definition implies the technology functionality, the product integrity as well as the market access (Milisavljević, 2000). When the sources of competitive advantage are placed in the context of the target markets, it is possible to identify four generic strategies - low costs, differentiation, focus on costs and focus on differentiation. The first two strategies are related to the mass market, while the other two concern the market niche (Đuričin and Janošević, 2006). Although the search for sources of competitiveness requires a broader conceptual framework, for the purpose of this research it has been primarily considered the question of cost management as a premise of cost leadership. It is the enterprise's ability that the design, production and distribution of products should be implemented in a more efficient way, i.e. at the lower costs than the competitive enterprises.

Strategic Cost Management

As previously pointed out, costs are not only one a source of competitive advantage, but also its close limiting factor. This is because they are closely related to other sources of competitive advantage. Low costs are the premise of the value generating. Factors that contributed to the fact that individual firms produce identical product at different costs are determined primarily by differences in technology, then by available capacities and the existence of a major or minor restrictions regarding the availability of certain resources i.e. production factors. For the management of costs, it is important to identify their drivers. These are the factors which cause the appearance of the cost, which may be the structural and executional ones. The aforementioned classification is arising from the structural choices and executional skills that determine the competitive position of the enterprise. The structural drivers of costs are related to the size, experience, technology, while the executional drivers are relates to the share of labour in the production process, then use of the capacity, product configuration, TQM (total quality management) etc. (Shank and Govindarajan, 1993).

Strategic cost management aims to facilitate reducing of costs with simultaneous improvement of the strategic enterprise position through the creation of greater value for customers. Previous conclusion suggests that the sources of competitive advantage are associated with the costs, which justifies the efforts in the cost management domain. Strategic cost management strongly relies on strategic cost analysis, which refers to the creation of information basis for identifying superior strategies for the enterprise cost differentiation, which will further enable the achievement of sustainable competitive advantage. On the basis of this analysis it is the relationship between the goods' and services' production costs on the one hand, and delivered value on the other one. This analysis assumes the value chain analysis, then the analysis of the cost drivers as well as the analysis of the enterprise competitive position. The key areas of consideration include the production process and the associated costs of acquiring resources, labour force, investment possibilities as well as establishment of the sales price, in order to consider the strengths and weaknesses of the enterprise and accordingly to define appropriate strategies (Foster, 2006).

Modern Systems of Cost Accounting

Successful cost management primarily requires their precise measurement. In the business circles it is often highlighted the maxim: "What cannot be measured, it cannot be controlled". For the measurement of costs it is competent the cost accounting, which has already applied for a number of decades various techniques i.e. cost calculation systems. The conventional cost accounting system which includes the calculation at actual costs, then the accounting system of standard costs as well as the accounting system of the standard variable costs, had its place and importance in conditions where human labour has dominated in the production process (where the direct labour hours are considered as one of the key drivers of costs). Also, they have an importance in the production conditions of the homogeneous products and mass production. If we look at the agro-business complex today, it is clear that the production programs of many enterprises within the field of agri-food sector have

wide range of products. Although this approach suited to the needs of external financial reporting, information obtained on the basis of traditional costing systems are not always suitable for the management of modern enterprises. Hence, in the professional and scientific circles there have been developed numerous modern techniques of cost accounting in order to be overcome the limitations characteristic for the conventional cost accounting systems.

The organization and implementation of each of the cost accounting systems require adequate human and material resources and initiate certain costs. Although at their disposal there are a number of the cost accounting techniques, the enterprise must define a particular approach in the cost determination. In relation to this, it is necessary to define the appropriate conceptual framework for the cost management in an enterprise. The company management is facing with the question: Which cost accounting system to choose?

When selecting a system of cost accounting, it is necessary to consider the following factors (Maher et al., 2012):

- system must be oriented to the decision-making process i.e. it has to provide relevant information for the management of enterprise;
- information obtained should enable the planning and control of business operations;
- to apply approach of different costs for different purposes, which should provide information on different costs, i.e. on variable costs for the purposes of decision making on the selection between the various available alternatives, while on the full or absorption costs relevant for the needs of external reporting;
- to achieve the balance of costs and benefits in terms that benefits of certain information utilization must outweigh the costs of their preparation.

As pointed out above, the selected cost accounting system has to produce information that will enable making numerous decisions critical to business success in the long run. Some of the decisions are relating to the fact whether to buy a specific product component or to produce it by itself, whether to accept a special order, whether to introduce a new product or to eliminate certain product from the product mix, whether to rearrange the existing product range etc.

When we are talking about the planning and control, the cost information should indicate to the management on what to do (in the case of agribusiness enterprises what to produce), then about the production volume, how much are the actual costs, the amount of deviation from the planned costs, the causes of deviations, as well as to enable the provision of recommendations for corrective actions.

Activity Based Costing

This concept is based on the activities implemented by the enterprise, but not on the narrow organizational parts i.e. cost centres. Activities can be defined as a set of tasks or groups of work operations related to the value creation process, i.e. the process of resources' spending in order to be created the result (product or service). From the cost accounting point, an

activity is realized as a set of activities with homogeneous character directed towards the creation of new values, i.e. the values for the customers. The advantage of this concept over traditional methods is reflected in obtaining more precise information on the costs of products and services (Popović and Vasilić, 2013). ABC information is widely used to assess continuous improvement and to monitor process performances. Also, this information is basis for making strategic decisions and for improving the profit performance (Cagwin and Bouwman, 2002).

When calculating the product costs, many manufacturers of agri-food products as keys for the allocation of overhead costs are using the revenues from sales of certain products. Also, it is dangerous to allocate all costs onto the produced products, since most of the costs do not vary with changes in production volume. Further this results in consequence that the selling prices of certain products are significantly higher than the prices of other manufacturers, which certainly does not speak in favour of achieving and maintaining a superior competitive advantage. By clearly showing the relationships between particular activities and overhead costs, the *Activity Based Costing (ABC)* allows much more accurate calculation of the costs, i.e. the allocation of indirect costs.

The essence of the *ABC* method consists of efforts that all activities in the enterprise should be differentiated onto the *primary activities*, i.e. those that directly contribute to the implementation of the tasks of a particular organizational enterprise unit and the *secondary activities*, which are a kind of support to the primary activities. For example, in an enterprise engaged in the production and processing of milk, the primary activities would include procedures for production and thermal treatment of milk, production and delivery of dairy products, while the secondary activities should be related to the process of the milking cows' feeding and watering as well as veterinary supervision of the cows.

Classification of activities can be carried out on the ones that add value of products and services (due to which customers are willing to bear the costs of such activities over the product price) and those activities that do not add value but increase the time and costs of production. In this regard, the *ABC* method contributes to an increase of the business efficiency by eliminating non-productive activities. The basic premise of *ABC* method is that the products and services consume activities, while activities consume resources and thus cause the occurrence of the costs (Mowen et al., 2012).

ABC method predicts that costs are allocated to activities that consume resources of an enterprise. These are as pointed out all the activities necessary to be produced a single product or the line of products. Then there have been identified the challengers for each defined activity that consumes resources. A number of cost drivers depend on the volume of production, while the majority of the cost drivers will be determined by the complexity of production, marketing and distribution. The greater complexity of the process means a greater number of the cost challengers. Some of the identified activities may have a greater number of cost drivers (machine hours, labour hours, the value of material, the number of

machine preparation, etc.). After allocation of the resources' costs to activities, the costs are further allocated from the activities to the cost objects i.e. the final products (Malinić and Janjić, 2012).

Although this method suffers criticism that it is expensive to be implemented due to the fact that it is necessary to analyse the overall activities in the enterprise, it is important to note that an effective *ABC* system contributes to an identification of the bottlenecks in production, which further contributes to a significant reduction of operating costs.

Target Costing

Starting from the changeable business environment and more intensive competition, one of the mechanisms to preserve the enterprise's market share is to define a target price that buyers are willing to pay and that its business (in terms of costs) adapts to the price defined in such way. This concept of management and cost reduction should be applied in the earliest stages of the product life cycle. Namely, the timely involvement in the design and development of all participants' products in the value chain, it is done adapting to market demands. Starting from the defined market price and the fact that the difference in price can identify a buyer to purchase a particular product, this concept realized costs as an input, and not as a result of the process, which means that the selling price determines the level of allowed costs. In other words, the costs are determined by the market, not by the enterprise. In the first step, it is necessary to determine what product should be offered to the market at a price that a potential buyer wants to pay, and in which it is also contained a sufficient target profit. Also, it is necessary to determine whether the existing enterprise competences provide the ability to produce a product at target costs, and that the quality and functionality of the product should not be reduced (Malinić and Janjić, 2012). The target cost amount must cover all of the expenses for producing the product: costs of inputs, costs of production and other operating costs such as marketing, sales and research expenses (Ellram, 2002).

The *Target costs* are defined as the difference between the anticipated price and the required return. In practice, target profit often is driven by medium term corporate profit plans, which reflect the returns demanded by the financial markets (Woods et al., 2012). This method is simple to apply in circumstances where prices are determined in advance or when they can be determined based on the products of other enterprises in the branch. Just one of the key problems with the application of this technique in agri-business complex is the fact that product prices often fluctuate, due to which it is not rare that in some years the manufacturers are making a profit, while at other periods there is a complete absence of profits, although there are no significant differences in production costs. Hence, determination of target price, as a starting input for defining the target costs, assumes market research, but also understanding the broader context of business. Within mentioned it is also included the problem of defining by the state the purchasing price for certain agricultural products, which varies from year to year significantly, not infrequently leading the producers in unenviable position. Hence, it is suggested that in such cases, when defining the target price, it is starting from the lowest price in the range of available prices for the recent few years.

Other issues that should be considered when defining the target prices are the following (Jack, 2008):

- Whether it can be negotiated on prices on the basis of costs and returns;
- Whether the prices can be determined on the basis of financial instruments (futures, options, forwards);
- Which is the lowest price at which it is possible to operate with a positive result;
- What are the potential risks if the defined price should not be realized?

Regarding the second element, i.e. the target profit or margin, it should cover interests, taxes and a part of the owners. What is specific in this case is the need that the fixed costs, that cannot be avoided (i.e. uncontrollable costs), should be added to the amount of the target profit or margin. In the case of one enterprise or a farm it is the absolute amount, while in the case of multi-enterprise organization the mentioned amount is determined as a percentage rate (Jack, 2008).

Finally, a problem with the *Target costs* contained in the fact that it is not possible to predict the prices of all inputs (because of the mentioned differences in the guaranteed purchase prices of certain products, but also because of the variable business operating conditions and a high degree of the production dependence on climate). In the case of agribusiness enterprises, the target costs include direct costs such as seed, feed, then the labour costs, machinery and equipment costs, maintenance of the facilities, quality costs, environmental costs (which will be more analysed later in the text) and numerous other costs. So, all these costs should be incorporated into the remaining part of the target price, which undoubtedly requires a high degree of rationalization of the business operations.

Achieving of rationalization requires that the *Target cost* should be more detailed decomposed onto the cost components. It is evident that a considerable amount of costs is related to the costs of materials and product components, because of what in reduction of the costs an exceptional place have the efforts undertaken by suppliers and other participants in the supply chain aiming at reduction in the purchase price of inputs used by manufacturing enterprises (Lalević, 2007).

In connection with the *Target costing* it is important to note that this concept is certainly not exhausted only by reducing costs. On the contrary, it is focused on continuous improvement of the enterprise business operations as well as the product operations aiming at an increase of the value for customers as a fundamental prerequisite for acquiring, maintaining and improving the enterprise competitiveness.

Cost Accounting through the Supply Chain

One of the key concepts that can help enterprises in their efforts to achieve and improve competitive advantages through cost reduction is the cost accounting through the supply chain. This comes from the fact that the issue of competition in modern business conditions is no longer viewed only in narrow boundaries between individual enterprises, but much

wider - between their supply chains. The supply chain includes all the participants, from the primary producers, suppliers, through distributors, which participate by their activities in the flows and transformations of goods from their initial stages, i.e. the raw material basis, to the final product for the consumer. In addition to the flows of goods, through the supply chain they are circulating certain information as well (Handfield and Nichols, 1999).

When it comes to the agribusiness complex, an experience shows that participation in the supply chain provides the following advantages (Rockel et al., 2002):

- reducing of losses in the storage and transport thanks to optimal coordination of activities in the chain;
- the product freshness and quality could be significantly improved;
- increased level of food safety;
- integrated supply chain that operates as a network generates products with a high degree of added value;
- significantly increase of the sales revenue;
- advancement of knowledge about the market for primary producers and at the same time an increase of their margins.

The value chain analysis is performed in order to be optimized and coordinated the links within the value chain. This is to contribute to greater satisfaction of customers in terms of cost efficiency, higher quality and faster product delivery. Hence, it is necessary to consider how the activities in the supply chain have been implemented and what looks like their mutual interaction (Hansen et al., 2009).

To achieve success in their efforts to make competitive advantages of particular supply chains, it is of crucial importance their stabile cooperation as well as an integration of efforts, in order that the jointly created value for customers should be significantly higher than the value that would be achieved through unsynchronized and separate efforts of individual members in the supply chain. It is important to note that suppliers and other participants make their own decisions about whether to participate in these efforts. Hence, the trust between business partners is considered a crucial element for the success of business improvement initiatives and reducing costs. Benefits associated with inter-enterprise collaboration include: increase the market share, share and reduce cost of product development, decrease risk of failure and increase quality of product, reduce inventory, gain rapid access to new markets (Bititci et al., 2004).

When it comes to the costs in the context of acquisition the competitive advantage of the supply chain, the aim is that amount of reduced costs reached on the basis of cooperation among participants in the supply chain exceeds the amount of savings in costs that the participants should achieve by their individual efforts (Sekerez, 2007). Transferred into the agribusiness complex, the goal is that the supply chain (e.g. in a dairy plant) achieves the greater savings in costs and in that way to deliver the greater value to the customers than the individual farmers, suppliers, distributors and other participants could achieve without such cooperation.

In the efforts to achieve a competitive advantage, a central position certainly belongs to the producer which should initiate the mentioned cost reduction. In other words, the aim is not to shift the costs to the next participant in the supply chain (thus the costs should be only additionally increased), but that through effective control within the enterprise itself, but also within the wider supply chain, the superior value should be delivered to the customers. This further requires a detailed analysis i.e. the breakdown of the supply chain onto the strategic segments, as well as identifying the drivers of costs in order to be detected the areas where costs can be reduced, i.e. where value can be increased. The next logical step is to reduce and eliminate activities that provide no contribution to creation of value, as well as the more efficient management of those areas that are key drivers of value creation (Malinić and Janković, 2011).

For these purposes it is often carried out the reconfiguration of the value chain, which should contribute to greater flexibility in the production process, then to the higher product quality, reduction in inventory levels and thereby in reduction of costs arising from holding of inventory (for storage, insurance, obsolescence, deterioration, interest costs based on the binding of funds in stocks), then reduction of waste due to a more efficient implementation of business processes, which directly contributes to the cost reduction (Malinić and Janjić, 2012).

In the case of a dairy plant, reconfiguration of the value chain may involve relocation of production and storage, greater flexibility of distribution process, changes in the schedule of the unprocessed milk delivery delivered by the cooperating partners, the choice of new cooperating partners that can provide the required quantity and quality of milk, but also changes in deliveries of finished products to the stores. This is especially because the costs of storage and transport can have a significant share in total cost structure and further complicate the struggle for achievement of competitive advantage. In this context, it is rational to consider the alternative of switching to *Just-in-time* inventory management system.

Lean Costing

The *Lean concept* is introduced into enterprise in order to creating value for the customers. The *Lean* reflects the strategic choice aimed to improve the competitiveness (Rao and Bargerstock, 2013). On the basis of the traditional approach to production, there are efforts to achieve economies of scale, then overproduction, as well as the creation of the stock surplus. This approach is diametrically opposite to the nowadays more accepted concept of lean production, which is characterized by advanced production techniques such as the cellular production, then the imperative of teamwork, *Just-in-time inventory management system*, *Total Quality management* and *Total Preventive maintenance* (in order to eliminate bottlenecks in production), then the *Supply Chain management*, etc. (Shah and Ward, 2003).

Although the *Lean concept* has been originally introduced by the *Toyota* (famous Japanese car manufacturer), the experience has shown that the concept can be successfully applied in all production branches including the agribusiness complex. Namely, the *Lean* philosophy

is infused by the efforts of reducing costs through the elimination of wastage (unproductive spending) in an enterprise with simultaneous improvement of the product quality and timely appreciation of the customer requirements. In fact those are the activities that are aimed at continuous improvement of business processes, in order to fully meet the needs of customers. It is well known that customers want high quality products with the lowest possible price, and that the small differences in price between the particular products may influence the choice of customers.

The fact that the *Lean* production concept is significantly different from the conventional production concept implies that for the purposes of the cost measuring and managing it has to be applied a slightly different system of cost accounting. This is especially because the *Lean* system is focused on value, particularly the value for customers. Furthermore, the processes that are necessary for the production of the products have been differentiated by the *Lean* system onto the flows of value and activities that generate value for customers. Hence, from the cost aspect it is necessary to determine the costs of particular activities. On the basis of obtained costs is possible to identify areas for improving business operations and consequently for reducing the costs. In order to obtain reliable information for the purpose of cost management, the performance can be measured at the level of the working cells (shifts in production), of the value flows and at the level of an enterprise (Shah and Ward, 2003).

The performances on the level of the working cell are monitored several times a day, for each working shift, in order to be immediately noticed the omissions in the work and to be prevented their repetition. As the omission it can be realized the spending that is larger than the standard one, or the inability to be reached a defined production quota. This would provide timely information, the data could be collected relatively easily and at low costs, in the short term it is possible to take corrective actions, while the employees are encouraged to actively participate in implementation of the *Lean* production objectives (Shah and Ward, 2003).

The performance at level of value flows are related to the efficiency of the value flow to deliver the required value for the customers. This assumes that it should be carried out the sharing of employees and machinery onto the value flows. Each value flow consists of the certain process and activities. Data (financial and non-financial) are collected on a weekly basis, and all expenses incurred within the value flow have the character of direct costs. The costs incurred outside the value flow relate to the maintenance of business operation and as such they are not relevant for the decision making process from the aspect of the value flow (Kennedy and Widemer, 2008).

As it was mentioned before, the *Lean* concept can be successfully applied in the field of agribusiness as well. In this regard, it is interesting the project initiated by the Swedish government in 2010, which was aimed at supporting agricultural enterprises in order to operate in accordance with the *Lean* philosophy. The goal of these efforts was focused on the "cleaner" agricultural production and strengthening of the agricultural sector competitive advantages. Concerning the farmers- co-operator of the large manufacturing enterprises,

they could also be included in the program through appropriate training. The aim is to organize the business so that every aspect is functioning efficiently, without stoppages and unnecessary wastage of resources, and that the human, material and biological resources contribute to the implementation of the *Lean* objectives. In this way the individual tasks will be realized more efficiently and in a shorter period of time, which will not only reduce costs, but will increase the share of leisure time that farmers can use in more creative ways. This reflects the basic idea of the *Lean* concept, which is that all efforts for improvement are directed towards an increase of satisfaction both for customers and employees.

Since the *Lean* idea is based on the continuous improvements, this assumes it is necessary to be detected problems in the production. For example, in a dairy plant the sources of the business non efficiency could be the following: inadequate maintenance of the milking equipment, frequent breakdowns and consequent stoppage in production, irrational cattle seating, the production volume exceeding the demand, ignoring the suggestions for improvements, misinterpretation of the tasks by the employees, errors in the selection of animals etc. The goal is to be eliminated the identified deficiencies, to be maintained the high quality of products and satisfaction of the customers, to be provide the strategic leadership and finally to be increased the profitability.

Since it has been increasingly paid attention to the environmental issues and that agriculture emerges as a significant source of greenhouse gas (GHG) emissions, the *Lean* concept through reducing waste can significantly contribute to solving environmental problems and hence the climate problems. In the production of milk, for example, this can be achieved by more efficient use of feed, fuel and electricity. What is important is to reduce the amount of GHG emissions per unit of product (in our case per litter of milk). This will not only improve the business operations of mentioned dairy plant, but the entire supply chain.

It is also important to note that the *Lean* philosophy does not require significant investments; this is the time to invest in thinking and problem solving. What is crucial is that through the troubleshooting process there has been acquired adequate knowledge that will help in achieving and maintaining the competitive advantages.

Environmental Costs as a Determinant of the Decision Making Process

In recent years, globally there have been increasingly manifested the problems associated with climate changes. The considerable impact in this process has the emission of harmful gases that produce the greenhouse effect. It is known that certain branches of agriculture and processing industries are important emitters of these gases. In addition to that, in agricultural production there are regularly used pesticides and other chemicals, fuel, water, which may have an unfavourable impact on the environment. The legal regulations of almost all countries of the world have introduced certain environmental laws and consequently high levies to limit pollution. In this regard, there appear the significant costs for enterprises concerning payments to different environmental taxes and penalties for disrespecting of the law. Increasingly rigorous legislation suggests that these costs tend to rise, which can certainly nullify the efforts of enterprises aimed at

reducing costs and maintaining of profitable business operations if they do not under taken adequate measures.

The practical experiences suggest that in many cost calculations the component of the environmental costs remains invisible. This hidden costs include the up-front environmental costs, such as search costs relating to finding the environmentally-conscious suppliers, initial design costs of environmentally preferable products, regulatory costs which are often obscured in overhead costs, etc. (Deegan, 2008).

This further has resulted in wrong information on the profitability of particular products and, more importantly, causes the making of wrong business decisions. Namely, failure to identify the causes of these costs (products whose production significantly degrades the environment) not only can prevent the advancement of the enterprise competitive position, but often these products appear as cannibals of the profitable products due to the increase of total expenses and endangering of the enterprise survival. In addition, a negative reputation in the field of environmental protection does not support the ability to increase sales of the enterprise. Hence, it is important to identify and carefully analyse the environmental costs for each product that the enterprise produces.

These costs can be classified into the following groups (Hansen and Mowen, 2010):

- *the costs of prevention* (evaluation and selection of suppliers, evaluation and selection of equipment, design of process and product, development of system for management of environmental issues, recycling of the products, the costs of ISO 14001 certification);
- *the costs of detection* (audits of environmental activities, inspection of products and processes, development of a system for measuring environmental performance, testing whether there was contamination of water, air and soil, measuring of the contamination level);
- *internal failure costs* (costs of operation and maintenance of equipment for pollution control, treatment and disposal of toxic waste, licensing, write-offs remaining after recycling);
- *external failure costs* (cleaning of contaminated soil and water, compensation for occupational injuries incurred due to environmental excesses caused by the enterprise, missed sales due to inadequate environmental performances, inefficient use of materials and energy).

Having at disposal precise information on the environmental costs undoubtedly increases the quality of management decisions, while by their timely consideration and through appropriate changes in design of products and business processes it is possible to eliminate unfavourable environmental influences.

Conclusion

In Republic of Serbia agriculture is a significant potential for economic development and at the same time it has an important place in the creation of GDP. However, it could be often

heard the complaints that Serbian economy as well as agrarian economy are not sufficiently competitive. Problem is, among other things, contained in the fact that many bearers of these activities (agricultural producers and processing industry) do not possess the relevant knowledge and ideas that would improve their competitive position in the market. One of the possibilities is in the operating costs' reduction together with maintaining and improving the product quality and functionality of the product. Effective cost management requires an adequate information base that could provide relevant information.

The limitations of conventional cost accounting systems observed in the practice initiate a need of more efficient cost identifying and accounting as the information basis for the need of management in the decision making process. The answer has appeared in the form of modern cost accounting systems - *Activity Based Costing*, *Target Costing*, *Lean Costing*, *Cost accounting through the supply chain* etc. It is important to stress that management of costs and their reduction is not an end in itself. On the contrary, behind each cost accounting is standing the corresponding concept of business management in an enterprise. These concepts are primarily focused on identifying all inefficiencies in current business operations in order to provide a basis for their elimination and improvement of business efficiency. Further it requires introduction of innovation in business, continuous improvement, analysis of the value chain, not only at the enterprise level, but also in the entire supply chain. Ecological aspects of business operation and consequent environmental costs are also an important information base for decision-making of management, as well as for the acquiring, maintaining and improving the competitive position of the enterprise. Only through the comprehensive analysis of the enterprise business operation and the costs incurred it will be possible to create superior value for customers in a more efficient way than the competing enterprises do and to conduct the profitable business operation in the long run.

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STRATEGIJSKO UPRAVLJANJE TROŠKOVIMA KAO INSTRUMENT UNAPREĐENJA KONKURENTNOSTI AGROBIZNIS KOMPLEKSA

Bojan Savić[5], Zorica Vasiljević[6], Dragan Đorđević [7]

Sažetak

Računovodstvo troškova kao segment integrisanog računovodstvenog informacionog sistema produkovanjem relevantnih informacija obezbeđuje značajnu podršku kako za finansijsko, tako i upravljačko računovodstvo. Navedene informacije predstavljaju informacionu osnovu za odlučivanje internih i eksternih korisnika (menadžmenta, investitora, poverilaca i drugih stejkholdera). U ovom radu posebna pažnja biće posvećena savremenim sistemima obračuna troškova čija primena se može posmatrati kao sastavni deo napora preduzetih u cilju merenja i kontrole troškova, budući da upravljanje troškovima predstavlja jedan od neizostavnih elemenata postizanja, održanja i unapređenja konkurentnosti preduzeća. Polazeći od značajnih potencijala koje Republika Srbija ima u domenu poljoprivredne proizvodnje cilj rada je da ukaže na izazove i specifičnosti upravljanja troškovima u preduzećima iz agrobiznis kompleksa. Otuda se u radu razmatraju savremeni sistemi obračuna troškova i metode upravljanja troškovima prilagođene specifičnostima poljoprivredne delatnosti koji menadžmentu domaćih preduzeća može pomoći u borbi za globalno tržištu poljoprivredno-prehrambenih proizvoda.

Ključne reči: *računovodstvo troškova, upravljanje troškovima, ekološki troškovi, agrobiznis kompleks, konkurentnost.*

5 Dr Bojan Savić, asistent, Univerzitet u Beogradu, Poljoprivredni fakultet, Nemanjina 6, 11080 Zemun, Srbija, Telefon: +381 11 26 15 315/ext. 211, E-mail: bsavic@agrif.bg.ac.rs

6 Prof. dr Zorica Vasiljević, redovni profesor, Univerzitet u Beogradu, Poljoprivredni fakultet, Nemanjina 6, 11080 Zemun, Srbija, Telefon: +381 11 26 15 315/ext. 412, E-mail: vazor@agrif.bg.ac.rs

7 Dragan Đorđević, doktorant na Privrednoj akademiji, Novi Sad, Čučuk Stanina 5, 11000 Beograd, Srbija, Telefon: +381 63 48 40 00, E-mail: dragan.doca@gmail.com

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AGRICULTURAL FRANCHISING AND CONTRIBUTION TO ACHIEVING OBJECTIVES OF THE EU COMMON AGRICULTURAL POLICY[1]

Milica Stanković[2]

Summary

The Common Agricultural Policy is the oldest, the most complex, the most expensive EU policy and it represents one of the most important drivers of European integration. Agrarian franchising is one of the innovations in the field of franchising, which implementation is still in its infancy and it is necessary to strive for the popularization of this business model. The aim of the paper is to emphasize the importance of agricultural franchising concept development and contribution of implementation of this concept to the achievement of the Common Agricultural Policy objectives and improvement of the agrarian sector as a whole. Special attention is paid on agricultural franchising as a hybrid form of disinvestment in conditions of economic crisis. Based on analysis of advantages and disadvantages of agricultural franchising, we conclude that it has the potential for solving a large number of problems that occur in the agrarian sector, with a particular focus on the importance of agricultural franchising to the achievement of the CAP objectives.

Key words: *Common Agricultural Policy, EU, agricultural franchising, disinvestment, CAP objectives.*

JEL: *Q13, Q18, O31, O33*

Introduction

The Common Agricultural Policy of the European Union (CAP) is formed since the creation of the European Economic Community. Therefore, it can be said that the Common Agricultural Policy is the oldest, but also the most complex and the most expensive EU policy. The original objective of the CAP is related to the provision of self-sufficiency in food, due to food shortages after World War II. Since its inception, CAP has gone through a

1 The paper does not contain particular research since agricultural franchising is an innovative business model, and its intensive implementation is expected in the future. In order to highlight the need for the implementation of agricultural franchising, the paper focuses on the contributions and benefits that this business model provides for agricultural policy and agricultural sector as a whole.

2 Milica Stanković, M.Sc., Teaching Assistant, Higher School of Professional Business, Vladimir Perić Street no. 4, 21000 Novi Sad, Serbia, Phone: +381 21 485 40 00, E-mail: milica.stankovic.vps@gmail.com

number of reforms. Through the effective implementation of the measures of the Common Agricultural Policy, EU member states have managed to become net exporters of agricultural products. During the long history of the development of the CAP the tendency was to achieve predefined objectives related to the improving the living standards of rural population, increasing agricultural productivity, stabilizing agricultural markets, regularity in food supply and ensuring reasonable prices for consumers.

Franchising as a business model is in the focus of a growing number of scientific and research studies, but it is necessary to pay more attention to agricultural franchising as an innovative business model. Franchising can be defined as a commercial relationship in which one party allows the other side to clone verified business model in exchange for the initial costs and ongoing fees. In line with current trends in the global environment, it should be emphasized the need for implementation of innovation in franchise concepts. Although innovative franchises are not usual business models, the application of this concept in the agricultural sector will bring much more benefits than disadvantages, so it is expected more intensive encouraging and popularization of agriculture franchising in the future. It is assumed that agricultural franchising contributes to achieving objectives of the Common Agricultural Policy of the European Union. Also, one of the assumptions in the paper is that agricultural franchising has many advantages which enable solving common economic problems that occur in the agricultural sector. Based on the analysis, author will try to confirm the initial hypothesis and obtain relevant conclusions.

The aim of this paper is to emphasize the importance of the development of the agricultural franchising and contribution of this concept implementation for the agricultural sector as a whole, with a particular focus on the contribution to the achievement of the EU Common Agricultural Policy objectives. The first part of the paper explains the concept of franchising as one of the most effective ways for a brand to reach global coverage, with special emphasis on agricultural franchising as one of the innovations in the field of franchising and prerequisites that must be met in order to implement this concept successfully. In the second part, we point out economic problems that commonly occur in the agricultural sector and potential advantages and disadvantages of agricultural franchising concept. The third part refers to agricultural franchising as a hybrid form of disinvestment in conditions of economic crisis. The fourth part of the paper focuses on objectives of the Common Agricultural Policy and the contribution of agriculture franchising for achieving these goals. Based on comprehensive analysis, we provide relevant conclusions and implications for future research.

Methodology and data-sources

This paper summarizes the data obtained from the analysis of the relevant available sources of literature on agricultural franchising as an innovative business concept and its importance for achieving the objectives of the Common Agricultural Policy. Data were collected from scientific research papers, conference papers, books and online brochures. Sources of recent date are mainly used, in order to give a comprehensive view of contemporary attitudes about the topic and to provide a basis for future research in the field of agricultural franchising. In addition to the analysis and synthesis of all the data obtained from available literature

sources, author provides her observations on the contribution of the agricultural franchising for achieving the objectives of the CAP.

The concept of franchising and its implementation in the agricultural sector

An increasing number of researchers put franchising as a business model in the focus of their studies. Number of franchises grows every day, bearing in mind that franchising offers better financial results and greater chance of survival than alternative organizational forms (Nijmeijer et al., 2013). By entering the world of franchising, we get complete business model that should be applied, and the risk is much lower than with starting an independent business. It can be said that the franchising is challenging concept, because it involves cooperation between two very different types of entrepreneurs (Barthelemy, 2008). Franchising implies business interaction between two reciprocally committed parties. In fact, it is a commercial transaction, in which one party allows the other side to clone a proven business system in return for initial and ongoing costs. One of the participants is the franchisor, who identifies business opportunities and establishes a company that will exploit the identified opportunities. Another participant is franchisee, who purchases from the franchisor the right to apply a business model to a new geographic market. The franchisor usually provides a range of services such as training, supply of products and marketing plans and receives an initial fee and royalties in return (Gillis et al., 2014). Franchisor provides support to franchisees, but usually has some control over how they run their business. The success of the franchise system depends on the strength of the franchisor- franchisees relationship. Franchisor performs management functions such as strategic planning and marketing, while franchisee concentrates on customer service. Franchisees have significant idiosyncratic investments (e.g., lump-sum payment, the annual royalty fee based on sales), and franchisors provide support in management, operational procedures, training and promotion (Mignonac et al., 2013). Franchising business network produces something that neither of the two parties can produce on its own and something that can not be easily duplicated (Hakansson, Snehota, 1995). To achieve balance in their roles, franchisor and franchisee should work together as a team, with common goals that are placed above individual interests. Therefore, factors such as trust, cooperation, commitment and loyalty are crucial to the franchise relationship (Stefanović, Stanković, 2013).

Franchising can be seen as a commercial club, whose individual members collectively use "club products". These products are similar to public goods, because there is no rivalry in their use. However, they are not pure public good because it is not technically possible or overly expensive to exclude other potential users from consumption. In existing relationship between franchisors and franchisees, a trade mark can be seen as a public good. Collective consumption of goods can lead to well-known problem of "free rider". The costs of such a deviant behavior (for example- cheating) bears collectively group, but only individual who has such a behavior achieve benefits. Because of the possible occurrence of moral hazard, it is necessary for the franchisor to be able to monitor and enforce compliance of quality standards (Dnes, 1996). Franchise agreement does not constitute a fully integrated structure, but a hybrid form of vertical integration. A contractual relation between two or more companies is considered to be franchising, only if following conditions are met (Rudolph, 1999):

1. There is one company, the franchisor, which continuously produces inputs over a long period of time (products, services and / or property rights) that are used only by a group of similar companies, franchisees.
2. In return, franchisees pay an initial franchise fee and royalty fees to the franchisor.
3. Franchise provides its franchisees a competitive advantage over other competitors who have not purchased the franchise.
4. Although the franchisee is not employed by the franchisor and has some freedom in its decision-making, the franchisor has the right to monitor franchisee's actions which can cause negative externalities for other franchisees.
5. Franchisor may, but does not have to be a company owned by entrepreneurs.
6. None of the franchisees does not have stake in the company owned by the franchisor.

Franchising is a powerful growth strategy which is proven as one of the most effective ways for brand to achieve global coverage. It is expected that franchising will provide better financial performances, supportive business environment and/ or a greater chance of survival than the alternative organizational forms (Nijmeijer et al., 2013). There is an increasing need for innovation in the franchise concepts in accordance with current trends in the global environment. On the one hand, it can be said that the most successful franchise systems are based on a proven business concept. On the other hand, proven franchise models could be declared as obsolete without the development of new products and innovative processes. Prior to the implementation of innovations in the franchise system, it is necessary to analyze advantages and disadvantages of implementing innovation. If it turns out that the expected positive effects are higher than costs, the implementation of innovations is justified. Otherwise, it is necessary to abandon the application of innovation. The term "innovative franchise" is not a technical oxymoron. However, the innovative franchise is not a common business model. From franchisees, it is expected to follow precisely defined procedures that determine what and how to produce and sell. However, even the most disciplined franchisors tend to apply new ideas (Stanković, 2013).

Agricultural franchising is one of innovations in the field of franchising and its implementation is still in the infancy. There are a few scientific papers on agricultural franchising as a new concept, and it is necessary to strive for the popularization of this business model. Prerequisites that must be met in order to apply the concept of agricultural franchising are as follows (Rudolph, 1999):

1. The limited growth potential of individual franchisees-In order to ensure simultaneous existence of a large number of franchisees, every individual franchisee should have limited growth potential in order. If there would be no restrictions on the growth of individual agricultural firms, then the most efficient company will grow without limits, slowly relegating its competitors.
2. A sufficient number of potential franchisees- In order to make a feasible franchise concept, franchisor must be able to sell franchise to a large number of franchisees.

The more franchisees buy a franchise, the franchise will be more profitable for the franchisor. Franchisor will choose for their partner's franchisees who meet specific requirements. If the base of franchisees is bigger, franchisor can choose franchisee that is more appropriate for him as a business associate. Privatization has led to bigger base of potential franchisees in agriculture than in most other sectors.

3. Franchisor provide at least one of the managerial and administrative functions- Key managerial and administrative functions should be performed by a central organization, while secondary functions can be implemented by decentralized business units. Franchisor should have a specific production technology, because otherwise these functions could be provided by the unspecialized consultants and professionals. Providing these functions should contribute to improving the competitiveness of the franchisees. Important functions in the agricultural sector are transfer of managerial skills from the franchisor to the franchisees, improving access to capital markets by franchisees, centralized marketing and centralized procurement of inputs. Franchisees can use franchisor's information, technological and managerial advice and distribution channels. A necessary condition for the feasibility of franchising in the field of agriculture is that franchisor provides managerial and administrative functions in the form of exclusive rights to ensure its franchisees a competitive advantage over other firms.
4. Decentralized decision making-Franchising is more efficient concept in relation to fully integrated organization form because the costs of control of local managers are generally very high and their motivation and productivity depend on the entrepreneurial freedom. Taking into account negative experiences from the time of central planning in public agrarian companies that were part of a fully integrated vertical organization, it is evident that costs of controlling agricultural companies are very high. In this sense, the franchise concept has contributed to reducing the cost of supervision. This is consistent with the fact that franchisees tend to achieve goals of the franchise concept, because franchisee's success and profit depends on the franchise's profitability.
5. Franchisor's creditworthiness and long-term business strategy- To start a franchise business, significant investments are necessary. Franchisor need to bear high costs related to seeking out potential franchisees, providing training and coaching, as well as providing the right mix of managerial and administrative functions to offer to franchisees a competitive advantage. A key obstacle in starting a franchise concept in agricultural sector is high initial costs and lack of funding to cover these costs. If it is possible to provide the necessary investment, one of the prerequisites for initiating the concept of agricultural franchising will be filled.
6. Irrelevance of idiosyncratic investments- Idiosyncratic investments are contractually specific investments or investments that are related only to the specific contract and may not be important for potential agricultural franchisees. If idiosyncratic investments are relevant, a higher degree of vertical integration could be a more effective organization form for agricultural firms than franchising. Also, if transport costs are very high, agricultural firms will choose to integrate with the companies that are located in

their immediate vicinity rather than to buy agricultural franchise. On the other hand, irrelevance of idiosyncratic investments will mean that franchise concept is more applicable in the comparison to other business models.

Advantages and disadvantages of agricultural franchising

Agricultural franchising has the potential to solve a number of problems associated with the agricultural sector in many countries. Therefore, it is crucial to develop a modified version of franchising that can serve as an alternative form of vertical organization for companies which produce agricultural products and provide agricultural services, especially in the transition economies. In developed market economies, many administrative and management functions are provided by agricultural extension services, cooperatives for marketing and purchasing and farmers' associations. In most developing countries these institutions either do not exist (for example, agricultural extension) or they have negative reputation (for example, cooperatives). Agricultural franchise agreement will be signed between agribusiness service company (the franchisor) and a number of farmers (franchisees). In return for a fee paid by the franchisees, franchisor will need to provide basic management and administrative functions. These functions are provided centrally by the franchisor and may include centralized marketing of outputs and procurement of inputs, management training and legal assistance. By providing such functions, franchisor can improve the competitive position of farmers who have become franchisees. Economic problems that occur in the agricultural sector, which can partially or fully be resolved by applying agricultural franchising are the following: outdated management techniques, lack of managerial talent, lack of access to credit markets, inadequate quality of available agricultural inputs and poor access to information on agricultural inputs and monopolistic market structures in the downstream sector. There are a number of advantages and disadvantages of franchising for both franchisors and franchisees. Advantages for franchisees which can be achieved by applying agricultural franchising are the following (Rudolph, 1999):

1. Multiplier effects of learning and transfer of management skills- From franchisees' perspective, the main advantage of franchising is the fact that they can use already tested business or product model and do not have to go through the painful process of "apprenticeship". In the past, directors of state companies and agricultural cooperatives performed orders routinely. Today, with the use of franchising, they became entrepreneurs who have a right to make their own optimal decisions in an uncertain market environment. They are now forced to apply management skills that have not had a chance to develop. Less innovative farmers can learn a lot from those more innovative through imitation. This imitative behavior leads to the process of technological diffusion. Strong geographical, political and language barriers can greatly affect the efficiency of the process of diffusion. If farmers continue to use outdated management techniques (especially in developing countries), their competitive advantage based on favorable climate, rich soil and abundantly available inputs will not be transformed into economic success. One of the central functions which

agricultural franchisors have to provide to their franchisees is training for managing the franchise units. Transfer of human capital from franchisor to its franchisees requires a long-term perspective and usually offers a competitive advantage for franchisees. Agricultural franchisors from developed countries who transfer management skills to their franchisees from developing countries have a huge potential for success.

2. Access to credit markets- Agricultural franchising helps farmers to solve problem of financing investments through reducing transaction costs and improving execution of agricultural credits. If agricultural franchisor becomes an intermediary in providing loans to its franchisees, he will have to bear virtually no additional transaction costs, because he has already collected the relevant information while the selection of franchisees. Agricultural franchisor can manage franchisees' loans more efficient than agricultural bank, let alone a bank in another specific sector.
3. Centralization of marketing- Agricultural marketing cooperatives for coordinating sales activities of agricultural companies are often set up in the agricultural sector, so that they can gain an economic advantage in line with the increased negotiating power. Centralized marketing is a management function that offers significant advantages for agricultural franchising and therefore should be included in the mix of services that provides franchisor. Franchisor has a better negotiating position and can get more profitable contract with the buyer than a farmer.
4. Managerial and administrative assistance relating to the procurement of inputs- Potential benefits of centralized procurement of inputs represent another important advantage of agricultural franchising. Procurement of inputs is a management function provided by franchisor which allows franchisees to gain a competitive advantage.

From the perspective of a franchisee, potential disadvantage of agricultural franchising are initial and royalty payments which can be large, even more than in case of starting your own business. Franchisees have to pay percentage of the monthly gross to franchisor reducing their profit potential. Limited creativity and flexibility is very important disadvantage of agricultural franchising, because franchise contracts usually left little or no opportunities for franchisees to express their creativity. Most franchise contracts have very rigorous standards that cannot be changed without franchisor's permission which limits franchisees in their creativity. Also, one of potential disadvantages of agricultural franchising is its potential exploitative character. Before franchisees sign a franchise agreement, there is competition between different franchisor that offer franchise agreements and among various franchisees who are competing for the same territory of the same franchise. However, when franchisor and franchisee sign the contract, they enter into a bilateral long-term business relationship. Although franchise agreement may specify a number of unforeseen circumstances, it is beyond human capabilities to write a contract that covers all contingencies that may arise during the contract period. Franchisor may have more information about the relevant contingencies than franchisees, due to their previous experience. This leads to an asymmetric distribution of information about the relevant circumstances, so franchise agreements are considered as potentially exploitative for perspective franchisees (Rudolph, 1999).

One of the most significant benefits for franchisors refers to the rapid expansion and faster coverage of agricultural markets through a large number of franchisees. In this way, larger franchise network can be formed and faster growth with less risk can be achieved. Also, franchisors can have a potentially high growth rate with less capital invested. Dynamic competition in market economies is one of drivers of economic growth. In the dynamic competitive process, firms that use their resources more effectively, achieve growth on account of other competing firms. Finally, the process of dynamic competition selects surviving companies and forces other companies into bankruptcy. Franchising enhances dynamic competitive forces through the improvement of franchisees' competitiveness which encourages economic growth. Agricultural franchising can perform pre-selection of franchisees based on their abilities and direct resources and investments to those franchisees that promise a higher probability of survival. Agricultural franchisor will have a strong economic incentive to take the pre-selection process similar to the one implemented the bank which assesses solvency of the loan applicant. This is because they will lose money if it turns out that their franchisee does not have skills necessary for success. The biggest disadvantages for franchisors are reduced ability to control franchisees, possible problems in relations with franchisees, as well as a lack of confidence in the franchise system (Centar za franšizing, Privredna komora Srbije, 2013).

Table 1. Pros and cons of franchising

Pros	Cons
FRANCHISEE	
• Agricultural franchisor will provide the most advanced management techniques, managerial support and training to its franchisees for the duration of the franchise agreement; • Agricultural franchising will improve credit usability and reduce transaction costs; • Agricultural franchisor will provide a sustainable high quality of inputs and will improve information for franchisees; • Agricultural franchisor will provide a competitive advantage for franchisees through a centralized marketing and procurement.	• Agricultural franchisees have to pay initial and royalty payments; • Agricultural franchisees have limited creativity and flexibility; • Franchise contract has potential exploitative character.
FRANCHISOR	
• Rapid expansion and faster coverage of agricultural markets through a large number of agricultural franchisees; • Agricultural franchisors have high growth rate with less capital invested; • Agricultural franchisor will choose the most talented entrepreneurs and sign the franchise agreement only with those franchisees that passed the process of screening and selection.	• Agricultural franchisor has reduced ability to control franchisees; • Agricultural franchisors can have possible problems in relations with franchisees; • Lack of confidence in the franchise system.

Source: Rudolph, 1999.

Agricultural franchising - a hybrid form of disinvestment in conditions of economic crisis

Franchising is almost unstoppable engine of growth in the global economy. However, in the light of the recent global recession, pressure is exerted on many business formats, especially with regards to downsizing. However, given the unique context of the franchising business model, this measure has a different meaning in this case. The relationship between the franchisor and franchisees is not the same as the relationship between employer and employee and thus traditional forms of dismissal considered invalid. Moreover, many franchise agreements are concluded for a period of 10 or even 20 years, so that short-term measures of temporary staff reductions are not feasible. The period of recession can even be useful for the franchise network that was flared excessively in the past. Challenging time for the economy forced some franchisees that simply are not able to survive to close their franchise units. Therefore, the economic decline can have unintended beneficial effect of "cleaning" in franchising, despite another very harmful consequences. The definition of business failure takes on a completely unique significance in the context of franchising. It is because a failure of franchised units can be hidden behind reacquisition strategy (reacquisition of non-functional unit by the franchisor and its subsequent sale to a third party), (Dant et al., 2011).

The need to cope with limited resources and constantly changing business environment compels firms on restructuring. Disinvestment strategy can be seen as an opportunity to change the destination of the investment and to adapt to the new competitive situation. Disinvestment transactions are transactions which cause intermittent and significant reductions of engaged resources and the elimination or extraction of business segments. These transactions often result in the formation of new business entities resulting from the company that disinvests. Disinvestment is traditionally associated with the conditions of economic crisis, when it can be considered as one of the options for the company's growth. It is pointed out that the main reasons for disinvestment (sale of business units) are actually poor performances and unfavorable expectations about future of some business units. Disinvestment should not be seen as the opposite of investment, but as a solution to financial problems and poor business results. In fact, disinvestment is one of the possible strategic alternatives that enable business growth through different resource deployment. Disinvestment mainly involves complete loss of control of the sold business, but it is not a rule. Strategic objectives of disinvestment can be realized through transactions that do not always involve sale of the entire company. These are "hybrid" disinvestment that attracts attention for several reasons. From a management perspective, they are important because they represent an alternative way of enhancing company's opportunities and providing a strategic renewal without the need for long-term investments.

Franchising as a hybrid form of disinvestment includes the creation of a new relationship between the franchisor and franchisees. In a franchise system, business network's corporate culture is strongly influenced by the process of selection and evaluation of franchisees. Disinvestment through franchising should be seen as a means of business development, especially in conditions of economic crisis. Special environmental conditions and strategic goals can motivate the company to use an agricultural franchising as a form of disinvestment.

Disinvestment through the agricultural franchising differs from other disinvestment forms because there is strict and formal control over the franchisee's activities. Also, there is very little risk to increase competition within the franchise system, because the relationship between franchisor and franchisees is mainly long-term and based on mutual trust. The main advantage of the agricultural franchising as a form of disinvestment lies in the nature of franchising compared to hierarchical organizations: strict control of independent individual enterprises through a "soft" hierarchy. Agricultural franchising is considered to be a quick way to achieve growth with limited capital investment.

In the conditions of economic crisis, agricultural enterprises often decide to franchise their business. The most common reasons for this are the lack of financial resources for conducting business, learning through business network expansion and internationalization of business. The franchise agreement is often mentioned as an ideal business format business in an unstable environment. However, the selection of franchisees and franchise locations are issues which should be taken into account, especially in conditions of economic crisis. A key motives for disinvestment through agricultural franchising are the following: faster growth at the global level and business network expansion, financial motives and the need for efficiency, internationalization of business (opening franchise locations in countries that are less affected by the negative effects of the economic crisis) and reduce of logistics costs. The main results of the application of agricultural franchising as a disinvestment model are: improvement of the average return per unit, higher total return and increased sales per unit (Baroncelli, Manaresi, 1997).

Agricultural franchising and objectives of the Common Agricultural Policy of the EU

The Common Agricultural Policy is the first EU policy that was usually focused on ensuring a fair standard of living for farmers over the 50 years long history (Riley, 2010). From its inception until today, CAP has experienced a large number of changes (Živadinović, Milovanović, 2011). In fact, measures that are oriented toward the realization of the set goals were changed over time. The EU Member States were able to grow from a net importer to a net exporter of agricultural products through the effective implementation of the Common Agricultural Policy. The main challenge, in the agricultural sector of the EU, will be to preserve the supranational character of the Common Agricultural Policy, due to the increasingly intensive efforts of member states, to create their own goals of rural policy and make a decisive impact on CAP (Živadinović, 2008). The Common Agricultural Policy is one of the most important drivers of European integration and survival of the EU. The key contribution of CAP is that it brought safe, stable and continuous supply of agricultural products to EU citizens (Martini, 2011).

The Common Agricultural Policy is a significant budgetary policy of the EU, which is fully established at the EU level and mainly financed from the EU budget (Erjavec et al., 2011). Because of high spending for CAP from the budget, it is often a stumbling block in making European budget. The Common Agricultural Policy is actually the first EU policy which provided the highest level of integration. From the very beginnings of CAP, it was clear that the integration of agricultural markets can not be performed as a negative integration (the

elimination of tariffs and other trade barriers), but rather as positive integration (replacement of national institutions and supranational organizations) (Brummer, Koester, 2003). Today's CAP is a result of changes and reforms that have been implemented over more than a half of the last century) last more than half a century. The focus of the CAP is to promote the multifunctional model of agriculture (Cardwell, 2006). CAP is a metaphorical living organism that responds to external and internal changes and enters them into its composition. Internal changes are related to changes in the internal market of agricultural products, while external changes include changes in the international market of agricultural and products (Milosavljević et al., 2008). Global trends point out more intensive liberalization of the agricultural sector, increasing level of agricultural production, specialization of production and integration into multinational companies (Vujičić, Đekić, 2003).

The key advantages of the CAP are: ensuring sufficient food for the population at any given time, EU was turned from a net importer into a net exporter of food, improving living standards of the rural population, increasing productivity of agricultural production, improving environmental protection and development of underdeveloped rural areas. There are certain disadvantages of CAP related to: excessive market surpluses that burden the budget, negative impact on soil, water, air, food safety and quality, un-fulfilment of one of the main goals of CAP - the development of rural areas, negative impact on the global flows in agricultural products trade. The main principles underlying the CAP are: single market, priority and financial solidarity (OECD, 2011). The single market is a principle which involves free movement of goods between member countries without customs and other charges with unique tariff rates for imported products. Therefore, the first principle relates to free trade within the community based on common prices. Priority is reflected in the precedence of EU products over imported products. Domestic market can be protected from foreign competitors through the special instruments (special import duties). On the other hand, there is help in placement of goods produced in EU to foreign markets through export subsidies. Financial solidarity involves joint financing of CAP's measures and mechanisms by member countries. So, all EU member states participate in costs of CAP, although the share in financing costs is not the same for all member states. CAP is determined by government of member states at EU level and it is implemented by the member states (Lovec, Erjavec, 2012). Today, CAP aims to encourage raise of product quality and to enable farmers to produce sufficient amounts of safe, high quality food for European consumers with respect to very high standards of environmental protection. The main objectives of the CAP are the following (Živadinović, Milovanović, 2011):

- Increasing the productivity of agricultural sector (primarily by improvement of technical development, rationalization of agricultural production and the optimal use of production factors);
- Ensuring a fair living standard for farmers (particularly by increasing wages in agriculture);
- Market stabilisation;
- Regularity in food supply;

- Ensuring acceptable price for consumers (ensuring reasonable prices of agricultural products).

The implementation of agricultural franchising can contribute significantly to the achievement of these goals. Primarily, the franchise concept ensures rationalization of agricultural production, as franchisees operate under the well-known business name and with constant monitoring from the franchisor. Technical development and rapid diffusion of technology among franchisees contribute to increase productivity of the agrarian sector. Agricultural franchising ensures an optimal use of production factors. In fact, franchisors usually supply franchisees with production factors and provide support in management of inputs. Considering that franchisors have previous greater experience in the management of inputs, it is possible to provide more optimal and rational use of available factors of production. Another stated goal of the CAP is to ensure a fair living standard for farmers. Agricultural franchisees use proven business model that survives on the market for a long period of time, so they face less risk than in the case of starting their own business. Thus, they have much lower initial start-up costs and they can achieve better earnings with less investment. Agricultural franchisees are committed to a profitable business of franchise unit and thus have an influence on their potential earnings.

Through dispersion of famous agricultural companies by franchise units all over the world, agricultural products will be available to a large number of people at affordable prices even in the developing countries. Agricultural companies from developing countries accept franchise concept within which they can rely on franchisor from some developed country in terms of management, training and support. In this way, the development of the agrarian sector is encouraged by expanding the network of franchise units and market of agricultural products is stabilized. In accordance to more intensive dispersion and increased number of franchisees it will be ensured regularity in food supply, even in the regions where there was a problem of insufficient agricultural products. For consumers, it will mean more security in terms of agri-food products they buy. In this way, trust and commitment to the products of a given brand will be built, by offering standard products and quality through proven business system. Another objective of the CAP is to guarantee acceptable prices of agri-food products to consumers. Franchisor mainly determines the recommended product price, which franchisees need to comply. If franchisee put a lower product price, he could become a competitor to other franchisees and the franchisor. On the other hand, self-determination of higher prices by franchisees would also lead to inconsistencies in the entire franchise system. Therefore, compliance with price recommended by the franchisor ensures reasonable prices for consumers.

Conclusion

The Common Agricultural Policy has provided the highest level of integration in the agricultural sector of the European Union. Today's CAP is a result of reforms that have been implemented over the last more than 50 years. Each of the reforms demanded the implementation of a number of innovations, all in order to achieve defined priorities of agricultural policy. Agricultural franchising is certainly one of the innovative concepts

which require an intensive use in the agricultural sector. Through the growing number of franchise units, agricultural franchising can provide better financial results than alternative organizational forms, since it is a proven business model in which the risk is much lower than that of starting a business.

In order to implement the agricultural franchising concept, it is necessary to fulfill certain conditions related to: limited growth potential of individual franchisees, sufficient number of potential franchisees, providing at least one of the managerial and administrative functions by the franchisor, decentralized decision making, franchisor's creditworthiness and long-term business strategy and irrelevance of idiosyncratic investments. Agricultural franchising has the potential to solve economic problems that occur in the agricultural sector. Problems are: outdated management techniques, lack of managerial talent, lack of access to credit markets, inadequate quality of available agricultural inputs, insufficient access to information on agricultural inputs and monopolistic market structures in downstream sector. Agricultural franchising provides a number of advantages for the agricultural sector of the EU member states and solves mentioned problems completely or partially. In conditions of economic crisis, companies are motivated to use an agricultural franchising as a form of disinvestment in order to achieve faster growth at the global level, business network expansion, financial benefits, internationalization of business and reduce of logistics costs.

Agricultural franchising contributes to achieving the objectives of the Common Agricultural Policy of the European Union. The main goals of the CAP are: increase in productivity of the agrarian sector, ensuring a fair living standard for farmers, market stabilization, regularity in food supply and guaranteeing acceptable prices to consumers. First of all, agricultural franchising ensures faster technology dispersion among franchisees, resulting in greater rationalization and productivity of the agrarian sector, through optimal use of production factors. Initial costs, for starting agrarian franchise units, are smaller than for the establishment of new agribusiness, franchisees can achieve greater profits with less investment and thus ensure a fair living standard for themselves. Availability of agricultural products and stabilization of the agricultural market will be provided through the dispersion of famous agricultural companies, by franchise units on global level. Increasing the number of agricultural franchisees will enable the regularity in the supply of agricultural products, especially in regions where there was a problem of insufficient food. Considering that franchisor generally determines the recommended product price which franchisees comply, reasonable prices of agricultural products are ensured for consumers.

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AGRARNI FRANŠIZING I DOPRINOS OSTVARENJU CILJEVA ZAJEDNIČKE AGRARNE POLITIKE EU

***Milica Stanković*[3]**

Rezime

Zajednička agrarna politika je najstarija, najkompleksnija i najskuplja politika EU i predstavlja jedan od najvažnijih pokretača evropskih integracija. Agrarni franšizing je jedna od inovacija u oblasti franšizinga čija je implementacija još uvek u povoju, te je neophodno zalagati se za popularizaciju ovog poslovnog modela. Cilj rada je da se ukaže na značaj razvoja koncepta agrarnog franšizinga i doprinos implementacije ovog koncepta ostvarenju ciljeva Zajedničke agrarne politike Evropske unije i unapređenju agrarnog sektora u celini. Posebna pažnja je posvećena agrarnom franšizingu kao hibridnom obliku dezinvestiranja u uslovima ekonomske krize. Na osnovu analize prednosti i nedostataka agrarnog franšizinga zaključuje se da agrarni franšizing ima potencijal za rešavanje velikog broja problema koji se javljaju u agrarnom sektoru, sa posebnim naglaskom na značaj agrarnog franšizinga za ostvarenje ciljeva ZAP.

Ključne reči: *Zajednička agrarna politika, EU, agrarni franšizing, dezinvestiranje, ciljevi ZAP.*

3 Milica Stanković, M.Sc., Saradnik u nastavi, Visoka poslovna škola strukovnih studija u Novom Sadu, Vladimira Perića Valtera 4, 21000, Novi Sad, Telefon: +381 21 485 40 00, E-mail: milica.stankovic.vps@gmail.com

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FINANCIAL BENCHMARKING THE EXAMPLE OF CONFECTIONERY INDUSTRY COMPANIES

Marina Vasilić[1]

Summary

Being a managerial tool of proven efficiency when it comes to managing companies in crisis periods, benchmarking concept is still insufficiently known and applied in the Republic of Serbia. The idea of this paper was to reveal its possibilities through the aspect of financial benchmarking, showing its simplicity and benefits even from the point of an external analyst. This was achieved through the analysis of two biggest competitors on the market of confectionery products of the Republic of Serbia, using secondary data analysis. Through multidimensional set of performance measures based on profit as the ultimate goal, but also including value for shareholders, liquidity and capitalization, we have confirmed the leader's market position and found its sources, which are the key learning points for the follower to adopt in order to improve its performance.

Key words: *benchmarking, performance analysis, confectionery industry, continuous learning.*

JEL: *M40, M21, G30, Q19*

Introduction

With the development of modern business practice in the Republic of Serbia, the term „benchmarking" timidly appeared as a foreign word with an attractive sound, but mostly unknown meaning. Managers who heard about it often misbelieve that benchmarking comes down to the process of measurement of company's performance and its comparison to given standards. Having in mind that experience of developed economies testifies on exceptional significance of benchmarking in managing companies and performance improvement, insufficient knowledge on this managerial instrument and the lack of its use by the managers in the national economy can be considered intolerable, at least.

According to the definition of the American Productivity & Quality Center (APQC, 1993), the idea of benchmarking lies in systematic and continuous measurement of business processes of an entity, in relation to the business processes of known market leaders anywhere in the world, in order to obtain information which would help the entity to improve its perfor-

1 Marina Vasilić, M.Sc., Teaching Assistant, University of Belgrade, Faculty of Agriculture, Nemanjina Street no. 6, 11080 Zemun, Serbia, Phone: +381 11 261 26 64, E-mail: marina.vasilic@agrif.bg.ac.rs

mance. Essentially, the benchmarking comes down to a simple idea of learning from the best, which proved to be a very efficient instrument for surviving the crisis periods worldwide.

Financial benchmarking is especially attractive and probably one of the most commonly used benchmarking concepts. This is primarily due to the attractiveness of the financial-accounting performance measures. Additional convenience comes from the fact that the whole process can be carried out without the actual knowledge and permission of the benchmarking partner, since most of the information necessary for the analysis is publicly available, due to the requirements of financial reporting regulatory framework. Thereby, companies are given the possibility to benchmark with virtually anyone in the world, in a relatively simple manner and without significant investment.

However, for the benchmarking process to result in information which is even remotely useful for improving company's performance, the selection of benchmarking partner needs to be planned carefully. In other words, if the peaks where best practices operate are so high that they cannot even be seen from the company's perspective, it would probably be more useful to benchmark with some closer leader. Another issue is the selection of the performance indicators. Generally, designing a balanced system of indicators is a challenge which must be overcome in order to create an adequate foundation for making relevant and correct conclusions. This represents the initial premise for performance improvement in the benchmarking process.

The choice of performance indicators is just the initial step. Adequately set, performance indicators provide very useful indices about which moves to play in order to promote company's results and catch up with benchmarking partner. Therefore, the task of performance indicators is not just to position the company against best practices, but to indicate the moves a company can make in order to reach (and outrun) the leader's performance level (or the benchmarking partner's). In this sense, the use of summary performance indicators, although inevitable for investors when evaluating the attractiveness of a potential investment, is considered to be insufficiently useful for financial benchmarking. Summary indicators do not provide information on value drivers, which are the building elements of performances. Performance gap analysis between the benchmarked company and best practice receives its full meaning on the level of value drivers, because of the highest learning potential which exists on this level. If a company manages to move the value drivers in the wanted direction, targeted performance improvement will not betray.

Paper goals

The subject of this paper is the process of financial benchmarking based on secondary data analysis, presented on the example of two companies from the confectionery industry, operating on the market of the Republic of Serbia. The paper aims to point out the possibilities of using the benchmarking technique in the process of improving company's results and performance, through the analysis of the achievements of a more successful competitor i.e. "best practice", identification of the sources of its performance and the application of the acquired knowledge in strategic and operational decision-making. Our idea was to show

that even the simplest type of benchmarking, performed using publicly available data, can be a useful source of information and knowledge in managing company's performance, and to indicate the possibility of using more complex benchmarking techniques which require a closer relationship and knowledge sharing between companies in the benchmarking process. Additionally, we wanted to point out that benchmarking analysis is not strictly a tool of business and finance, and that it can and should be used in a wide range of companies, including the agricultural sector. Furthermore, we wanted to examine the cost-effectiveness of this type of benchmarking.

The selection of the benchmarked companies Bambi and Stark enables the financial benchmarking to be carried out between two companies which are the biggest competitors in the market of biscuits and confectionery products in the Republic of Serbia, and at the same time the biggest leaders on this market, therefore the closest leaders (Jašarević, Ličina, 2013). Considering their financial results in the period 2010-2012, we wanted to show how Stark can learn and improve its performance in the near future, benchmarking with Bambi as the "best practice".

Methodology and data sources

We have tested the following hypotheses in this paper: (1) the methodology of the financial benchmarking is applicable in different types of organizations; (2) the methodology of financial benchmarking is useful for performance improvement; (3) financial benchmarking based on the publicly available data is cost-effective tool.

The research was performed using the secondary data analysis. The set of financial statements of analyzed companies, accompanied by the independent auditor's opinion, both published by the Republic of Serbia Business Registers Agency, was used as the primary data source. Necessary financial market information was collected from the data published by the Belgrade Stock Exchange and Central Securities Depository and Clearing House. Additional information on the operations of the subject companies in the relevant three-year period and following years were collected from the company websites and other publicly available sources.

Having in mind that both companies have the same reporting framework, consisted of IFRS, IAS and national regulations of the Republic of Serbia, we can expect a relatively high degree of comparability of data published in their financial statements. Harmonization and standardization of the financial statements should result in information which is relevant, credible and comparable (Škarić, 2012). This is one of the important assumptions for the quality of this type of financial benchmarking process. Namely, the identical financial reporting framework and the identical form of financial statements pretend to ensure the comparability of financial information presented by different companies, in form and essence. Publicly available audit reports of the analyzed companies represent an additional guarantee of the quality of their financial statements, having in mind that the auditor's opinion on financial statements of both companies was unqualified for all three years.

However, it is a fact that an external analyst can never be completely assured in the level of comparability of the official financial statements i.e. the conclusions of his analysis. Without aspirations to analyze the causes of inadequate financial reporting and the possibilities for their overcoming, we draw attention to several important matters - the use of different accounting policies, the risk of numerical and essential errors and misstatements which can remain in the financial statements of a company even after the audit, and the fact that unqualified auditor's opinion is finally just an expert's opinion which cannot represent a complete guarantee of the quality of the financial statements. In addition, the analysis had shown an extraordinary event Stark was involved in – a status change, which significantly affected its annual financial statements for 2012. These restrictions must be taken into notice when interpreting the results of the benchmark analysis. Therefore the results should be taken with commensurate caution.

In the process of financial benchmarking of Bambi and Stark, we used the methodology elaborated on the financial benchmarking course of the PhD study program of the Faculty of Economics, University of Belgrade. In this respect, multidimensional set of performance measures calculated using the data provided by the secondary analysis was used. Performance indicators were chosen based on their relation to strategic goals of a company. Except for yield as the ultimate strategic goal, companies will often have a whole variety of goals, such as profitability, long-term stability, capitalization, liquidity, growth and dividends (Malinić, 2010). For each of these targets, there are series of indicators which can be used for their quantification. When it comes to choosing the indicators which will be used for benchmarking, it is important to be guided by the principles of cost-effectiveness and sustainability and to choose a relatively small number of well-known and widely used indicators. It is usually recommended to use ten to fifteen indicators (Malinić, 2010). For the purpose of the analysis, indicators were chosen on the basis of profitability as the ultimate strategic goal, but other goals were included in the analysis as well, such as value for shareholders, liquidity and capitalization, in order to obtain the overview of performance from several different aspects and create a basis for conclusions on possibilities for their promotion.

Results and discussion

Profitability was analyzed using Return on common equity (Table 1). This indicator is especially useful because it can be broken down to its structural parts, which enables performance analysis on the level of value drivers (Malinić, 2010).

Comparing ***ROCE*** (Picture 1) it is obvious Bambi had better results, but also that both companies made progress in 2012. Bambi's performance improvement arisen as a result of a higher ROOA with positive spread and smaller financial leverage effect. On the other hand, Stark recorded a significant increase in financial leverage in 2012, thanks to which it managed to get closer to Bambi's performance level. A more detailed analysis of Stark's sources of performance in 2012 should indicate if this progress was based on real grounds. Reaching the leader's position for Stark would require further progress in improving RNOA keeping the positive spread. It should be also taken into notice that Bambi will probably keep on with improvement of its own performances as well.

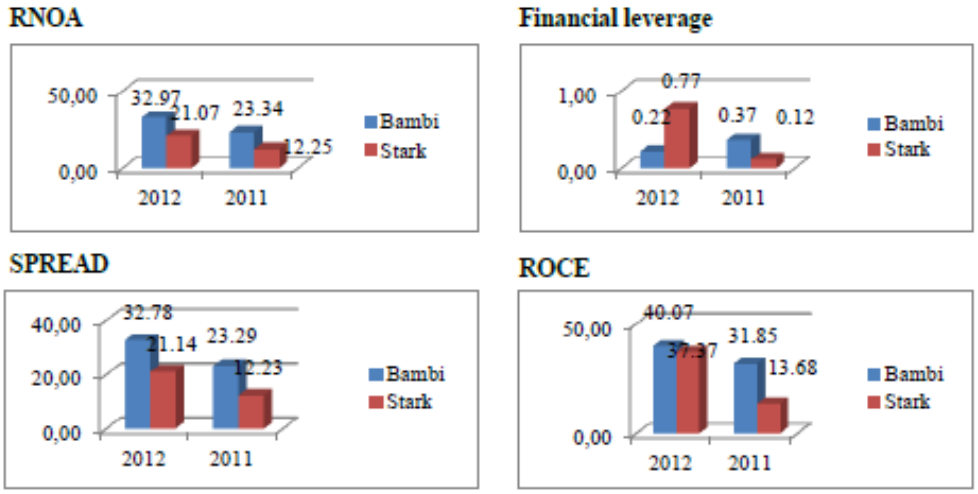
During the whole period, Bambi had higher ***gross profit margins*** and higher operating profit margins, even with higher participation of all cost categories (Picture 2). Therefore, the possibilities for improvement of operating profit margin for Stark lie in the increase of gross profit margin, i.e. in increase of sales and decrease of direct material costs (keeping the same quality of inputs), as well as the purchased value of goods sold. Both companies could achieve additional increase in operating profit margin in the following period, through minimization of salaries and other operating expenses.

Table 1. Profitability analysis for the purpose of financial benchmarking (in 000 RSD)

No	ITEM	BAMBI		STARK	
		2012	2011	2012	2011
1	Gross operating profit / Revenue	61.61	57.70	46.86	42.77
2	Administrative expenses / Revenue	1.52	0.83	0.56	0.58
3	Advertising / Revenue	8.43	7.86	6.82	6.13
4	Salaries / Revenue	15.25	16.65	13.71	15.06
5	Other operating expenses / Revenue	17.26	18.16	13.77	12.43
6	**Operating profit margin (1-2-3-4)**	**19.14**	**14.20**	**11.99**	**8.57**
7	Income	8,226,378	7,829,170	8,164,999	6,960,230
8	Average net operating assets (NOA)	4,776,182	4,763,483	4,645,382	4,869,111
9	Average current operating assets	3,756,691	3,623,672	4,702,616	3,700,469
10	Average long-term operating assets	2,603,467	2,668,377	2,763,999	2,790,059
11	Average operating liabilities	1,583,976	1,528,566	2,821,233	1,621,417
12	Operating current assets TO ratio inverse	0.46	0.46	0.58	0.53
13	Operating long-term assets TO ratio inverse	0.32	0.34	0.34	0.40
14	Operating liabilities TO ratio inverse	0.19	0.20	0.35	0.23
15	**Turnover ratio (ATO) (7/8)**	**1.72**	**1.64**	**1.76**	**1.43**
16	**Return on net operating assets (RNOA) (6*15)**	**32.97**	**23.34**	**21.07**	**12.25**
17	Average net financial obligations (NFO)	850,644	1,274,951	2,022,112	511,961
18	Average stockholders' equity (SE)	3,925,538	3,488,532	2,623,270	4,357,150
19	**Financial leverage (FLEV) (17/18)**	**0,22**	**0,37**	**0,77**	**0,12**
20	Net financial expenses (NFE)	160,174	62,483	-149,512	10,883
21	Average net financial obligations (NFO)	850,644	1,274,951	2,022,112	511,961
22	**Net financial expenses rate (NFR) (20/21)**	**0,19**	**0,05**	**-0,07**	**0,02**
23	**SPREAD (RNOA-NFR) (16-22)**	**32,78**	**23,29**	**21,14**	**12,23**
24	**ROCE (16+19*23)**	**40,07**	**31,85**	**37,37**	**13,68**
25	Operating profit	1,574,717	1,111,731	978,722	596,363
26	Average operating assets	6,360,158	6,292,049	7,466,615	6,490,528
27	**ROOA (25/26)**	**24,76**	**17,67**	**13,11**	**9,19**
28	Average operating liabilities	1,583,976	1,528,566	2,821,233	1,621,417
29	Average net operating assets (NOA)	4,776,182	4,763,483	4,645,382	4,869,111
30	**Operating leverage (OLLEV) (28/29)**	**0.33**	**0.32**	**0.61**	**0.33**
31	ROOA	24.76	17.67	13.11	9.19
32	Short-term borrowing costs rate (STBC)	0	0	0	0
33	**SPREAD (ROOA-STBC)**	**24.76**	**17.67**	**13.11**	**9.19**
34	**(RNOA (ROOA+OLLEV*(ROOA-STBC)**	**32.97**	**23.34**	**21.07**	**12.25**
35	**ROCE=ROOA+OLLEV*SPREAD+ FLEV*SPREAD**	**40.07**	**31.85**	**37.37**	**13.68**

Source: authors' calculation based on financial statements data

Picture 1. ROCE analysis – first level of the analysis (in RSD)



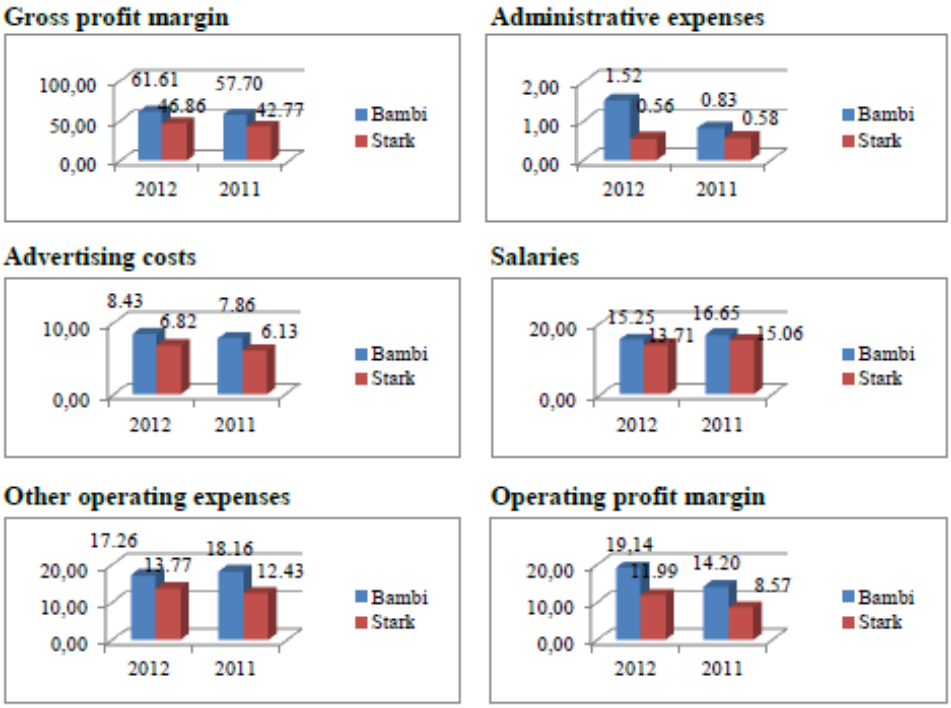
Source: authors' calculation based on financial statements data

For the purpose of the analysis of ROCE value drivers in financial benchmarking of Bambi and Stark, ***turnover ratios*** were displayed in their inverse form. This should be taken into account when interpreting results – higher efficiency means lower values of ratios in this case. It is notable that even though Bambi had better results, in 2012 Stark catches up when it comes to efficiency in managing net operating assets. Keeping this trend in the following period would enable Stark to promote its RNOA and increase ROCE. On the other hand, the same goes for Bambi. If Bambi as a leader keeps on with performance improvement, Stark will have to make an additional effort in order to catch up.

Both companies had positive ***financial leverage*** effects in the analyzed period. However, different trends were achieved. Bambi had a decrease in financial leverage level in 2012, thanking to a significant decrease in the level of average net financial liabilities in relation to 2011. Still, Bambi managed to achieve growth in ROCE, due to more efficient use of net operating assets (RNOA is at a significantly higher level in 2012 than in previous year).

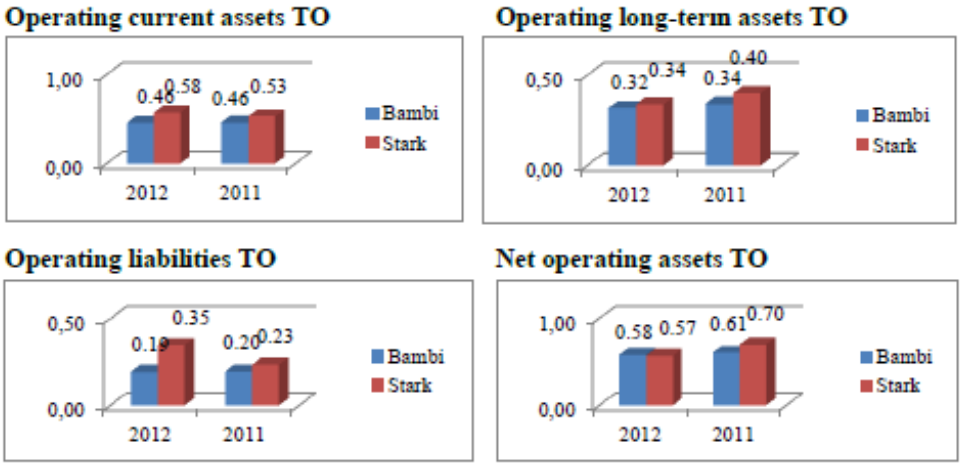
On the other hand Stark had an exquisite growth in the level of financial leverage. This was due to the simultaneous and significant increase in average net financial liabilities and decrease of average capital. The analysis of Stark's structure of financing sources in 2012 shows atypical changes. Namely, income statement for 2012 shows net profit, but balance sheet shows a loss which led to decrease in capital to 13% of its value from the previous year, even with the same shareholders equity and significant increase in capital reserves. More detailed research showed that Stark had a status change in 2012, whereas the acquiring company it incorporated two companies which seized to exist (the fact that those were the companies which were the only owners of Stark at that time is not without significance).

Picture 2. Gross profit margin value driver's analysis – second level of the analysis (in RSD)



Source: authors' calculation based on financial statements data

Picture 3. Efficiency value driver's analysis – third level of the analysis (in RSD)



Source: authors' calculation based on financial statements data

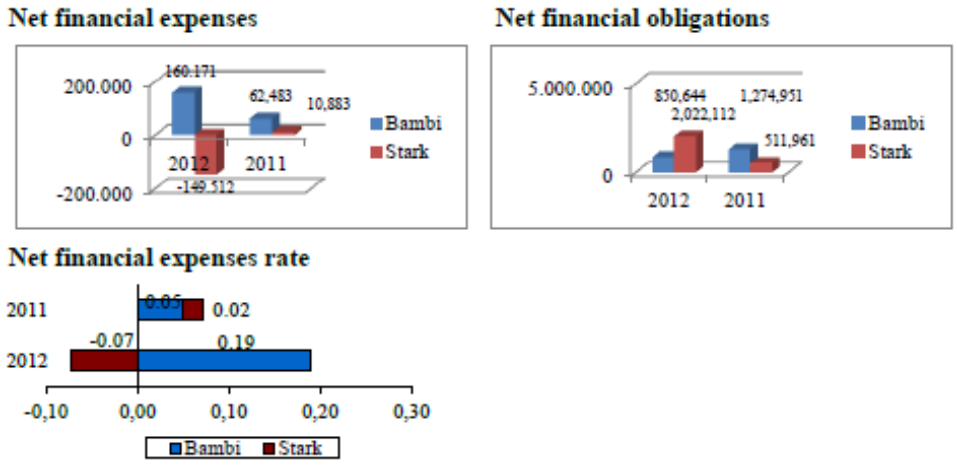
Undoubtedly the mentioned transaction had consequences on the financial statements of Stark for 2012, due to which an additional caution is necessary when making conclusions on its performance in the subject year, and especially in projecting its future results. Analy-

sis in the following years will show whether the significant increase in Stark's ROCE in 2012, thanks to which it got closer to Bambi's performance level, resulted from better management of available assets, or it is just an optical illusion of the financial reporting system.

Bambi and Stark had different trends when it comes to ***net financial expenses*** rate (Picture 4). Bambi had a significant increase in net financial expenses in 2012. Together with the decrease of average net financial liabilities, this caused the growth of net financial expenses rate to an almost four times higher level than in 2011. However, thanks to a higher return on net operating assets, Bambi managed to keep a positive spread, and to maintain ROCE on a higher level than RNOA.

On the other side, Stark had higher financial income compared to financial expenses in 2012, which is why the shown net financial expenses rate is negative. Analyzing the available data, we have come to a conclusion that this occurred as a consequence of a significant participation of FX gains in total financial income (probably arisen from the mentioned status change in 2012). At the same time, there was a dramatic increase in the level of average net financial liabilities. Accordingly, it can be concluded that Stark needs to be especially careful in the following period, and to try to keep its 2012 performance level through the improvement of return on net operating assets. Due to the high growth of net financial liabilities, a growth of financial expenses is expected in the future (this would be followed by a higher cash outflows, except if the debt would be converted to capital, which is formally possible for Stark as it had changed its form to limited liability company in 2012).

Picture 4. Net financial expenses analysis (in RSD)



Source: authors' calculation based on financial statements data

Both companies had a significantly higher level of ***free cash flow*** in 2012 (Table 2), thanks to higher operating profits but also to disinvestment i.e. decreasing the level of net operating assets. Thereat, Stark's results must be interpreted with caution, due to status change in 2012 (this especially taking into account extremely high level of net financial liabilities in 2012 which Stark needs to repay in the following period).

Table 2. Cash flow analysis for the purpose of financial benchmarking (in 000 RSD)

ITEM	BAMBI		STARK	
	2012	2011	2012	2011
Operating profit	1,393,007	1,057,560	1,135,374	556,287
Change in net operating assets (NOA)	-67,335	92,733	-720,358	272,900
Free cash flow (FCF)	**1,460,342**	**964,827**	**1,855,732**	**283,387**

Source: authors' calculation based on financial statements data

The final step in the performance analysis is the market indicators analysis. In normal circumstances, it is expected that continuous liquidity, strong financial structure, efficient asset and capital management and increasing profitability are translated into appropriate high and growing market values (Malinić et al., 2013). However, one of the basic assumptions for that to happen is the existence and functioning of the financial market i.e. the existence of enough stock transactions in order to form a relevant market price. It is necessary to point out that this assumption was not completely fulfilled when it comes to Stark, due to which calculated market indicators need to be interpreted with caution.

Namely, the volume of transactions with Stark's stocks was negligible from the very beginning of their appearance on the stock market, and in 2013 the company seized to exist as a public company. On this occasion, the majority owner performed a compulsory purchase of the remained stocks at 1,420 RSD per share, which can be considered as the indicator of the lower limit of Stark's shares value at that time. On the other hand, market price of Bambi's shares had an increasing trend in 2013 and 2014, and it reached a record of 38,500 RSD in January 2014. This represents an additional confirmation of abovementioned stance on market valuation of companies with good performances, even in the case of undeveloped financial market of the Republic of Serbia.

Analyzing market indicators of Bambi and Stark (Table 3), as a final aspect of their performance analysis for financial benchmarking purposes, we have come to several conclusions. Namely, it is obvious that financial market highly valuates Bambi, regardless of the fact that it made a shift in its dividend policy and that total shareholder's return decreased. A significant portion of earnings was retained in the company and it is expected to contribute to its future growth and the increase in its share value, accordingly (which had shown in the years that followed). When creating dividend policy, companies necessarily consider the dividend preferences of the most important shareholders (Zakić et al., 2012). Therefore, Bambi's shareholders favour the policy of low and relatively steady dividends, expecting high capital gains in the future.

On the other hand, Stark's dividend policy in the whole analyzed period consisted of retaining the whole earnings, without payment of dividends. When we have in mind the Stark's ownership structure at the time, where there were few dominant shareholders who finally became the sole owners of Stark thanks to the institution of compulsory share purchase, it is clear that one cannot rely on market information when assessing Stark's performance. Although Stark significantly improved its operating result formally, it is actually yet to use the synergetic effects of the performed status change, above all by searching the possibilities

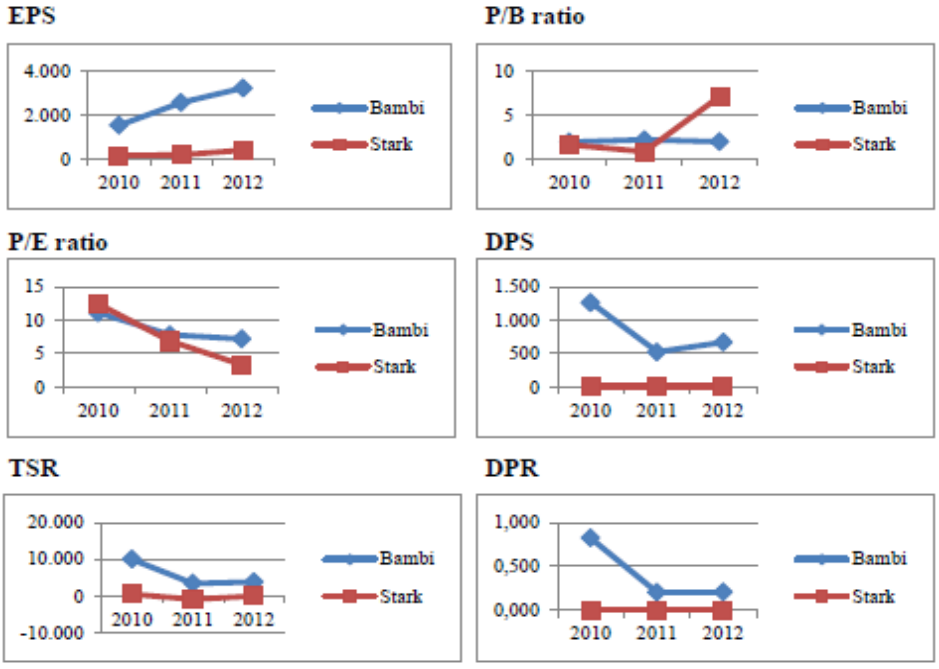
for increasing gross profit margin, through minimizing the costs of material and purchase value of goods sold on one hand, and increasing income, on the other.

Table 3. Market indicator analysis for the purpose of financial benchmarking (in 000 RSD)

ITEM	BAMBI			STARK		
	2012	2011	2010	2012	2011	2010
Net profit after tax	1,098,494	897,929	556,003	1,302,702	574,096	526,696
Number of common shares	360,106	382,899	382,899	3,268,826	3,268,826	3,268,826
Number of repurchased own shares	19,947	33,764	20,178	0	0	0
Weighted average of common shares	340,159	349,135	362,721	3,268,826	3,268,826	3,268,826
EPS	3,229	2,572	1,533	399	176	161
Nominal share value	4,100	4,100	4,100	600	600	600
Market share price	23,200	20,000	17,000	1,317	1,200	2,000
P/E ratio	7	8	11	3	7	12
Bookkeeping share value	11,792	9,203	8,826	184	1,421	1,245
Stockholders' equity	4,246,450	3,523,639	3,379,630	602,855	4,643,685	4,070,615
P/B ratio	2	2	2	7	1	2
DPS	669	524	1,260	0	0	0
DPR	20.70%	20.37%	82.20%	0.00%	0.00%	0.00%
Capital gain	3,200	3,000	8,750	117	-800	600
TSR	3,869	3,524	10,010	117	-800	600

Source: authors' calculation

Picture 5. Market indicators analysis (in RSD)



Source: authors' calculation

Nevertheless, the performance analysis is only the initial step in the process of financial benchmarking. It enables a company to locate its current position in relation to the benchmarking partner and to set realistic improvement goals relative to effective performance (APO, 2005). It is well known that managing a modern company can no longer be based only on the information generated in within a company (Milićević, 2006). Once a company knows what other organizations are achieving, it can use that information to set appropriate targets (Stapenhurst, 2009). Benchmarking against best identified practices, if suitably adopted and adapted, can generate a company considerable profit of performance within a very short time (Maire et al., 2005). The problem is to define and identify "the best". It is usually the undisputed leader in the process that is critical to a business success - regardless of the sector or the location (Codling, 1995).

It should also be pointed out that performance measurement is never a onetime act, and that it needs to be performed continuously in several successive periods. Namely, the benchmarking process actually begins with identification of performance gap (and gap in value drivers). However, focusing on performance measures gives little information about how to improve and close the gap to partner. If learning, motivation and improvement are to be the result of benchmarking, it requires that the causes for the performance gap are the focus of attention (Andersen, Pettersen, 1995). In the following phases of the benchmarking process, after taking on the appropriate activities for performance improvement, measurement is necessary to be repeated continuously, in order to identify the result of the activities taken, but also to follow the position of the benchmarked leader. Managing performances in order to reach (and outrun) the leader (or other benchmarking partner), one should always be aware of the fact that the leader itself will also work on improving his own performance in the same period. In other words, it is expected that targeted performance level goes higher and higher from period to period. The benchmarking process is continuous because of the high rate of change in the business environment due to which benchmarks are continually redefined (Zairi, Leonard, 1994). It is a journey toward true improvement and excellence (PERI, 1999).

The results of our analysis clearly indicate that Stark must act on multiple fronts in order to reach the performance level of the benchmarked leader. Above all, it is necessary to react on minimizing the expenses of direct material and goods, in order to increase gross profit, with the same or increasing income. Considering current trends in the economy and agriculture, it is very difficult to expect the decrease of production costs (Todorović, Filipović, 2010). Stark could, for example, invest in improvement of production process in a technological aspect, which would enable the production of the same final product but with the use of cheaper material or decreased other production expenses. Even a smaller promotion in the production organization can result in significant savings of production expenses, and accordingly improve the company's performance. That said Stark would especially benefit from benchmarking with Bambi on the level of certain products or production lines, where they are direct competitors. However, this type of benchmarking would require intense cooperation between benchmarking partners and exchange of business information, which is not likely to happen when it comes to these companies. Stark could possibly benchmark with leaders from other food industries or international leaders from the same industry, to acquire new knowledge on

the possibilities for technological or organizational improvement of the production process. Unfortunately, recent research into the use of benchmarking in the food supply chain among distributors, manufacturers and retailers has shown that there is relatively little evidence of benchmarking, despite its popularity in other commercial sectors (Jack, 2012).

On the other hand, it would be useful for Stark to consider the possibility of increasing sales through additional expenses for advertising and product branding which could result in higher volume of sales in the following period, or possible increase in sale prices of its products. Also, Stark should look for indices on those customer needs which are not adequately satisfied by the leader through its own product range, using market research tools, and then adjust its products accordingly.

Possibilities for cost savings lie in the field of other operating expenses, as well. More detailed analysis of available resources and future expected needs can be used for rationalization of the number of employees and cost cutting when it comes to salaries (Đerković, 1999). The same approach can be applied to the group of other operating expenses, as well as the administrative expenses.

One of the challenges for Stark in the following period undoubtedly lies in extremely high short-term liabilities, both operating and financial, which fall due for payment in 2013. That said Stark should especially tend to cash flow management, in order to maintain the liquidity of the company and keep the regular flow of operating activity. Among other things, efforts must be made in turning accumulated receivables into cash.

However we must note that the objectivity of Stark's performance analysis in this case is somewhat limited with the fact that there has been a status change in the recent past, with material effects on the financial statements. When it comes to financial recording, i.e. actually valuating entities involved in a status change, especially when it comes to related entities, experience tells us that such cases require a significant amount of caution.

For those very reasons, Stark approaching Bambi's performances in 2012 cannot be considered as a completely reliable conclusion. Better judgment can be made after the analysis of performance in the following years.

Conclusion

Managing a company and reaching targets has always represented a challenge. In terms of modern businesses and overall crisis, with poor and expensive resources, illiquidity and severe competitors game in extremely turbulent surroundings, business decision making actually turns to everyday battle for survival. In order to successfully overcome the obstacles they encounter on a daily basis, managers must have a whole arsenal of managerial instruments at their disposal. Embracing well known strategies and wandering through trodden paths is a safe way towards failure.

Turbulent surroundings require continuous vigilance and willingness to take action. The benchmarking process provides just that. Its implementation enables a company to learn using the experience of others, whether they are direct competitors or best practices from other

industries. This way, a company can be aware of possible moves of a competitor and at the same time prepare a timely response to it, but also to gain useful ideas on how to implement best practices from other industries in order to improve its own performance.

Financial benchmarking is especially useful because it can be performed using publicly available information, with satisfying level of reliability, modest investment and without the actual knowledge and consent of the benchmarking partner. More detailed analysis of performance indicators on the level of value drivers enables a company not just to identify the gap in performances but also to find the possible manners for its reduction i.e. for reaching the level of a leader, and continuous improvement afterwards.

The process of financial benchmarking was elaborated in his paper using the example of two companies doing business in the Republic of Serbia, which are the biggest competitors on the market of biscuits and confectionery products. The leadership of Bambi was confirmed through the multidimensional set of performance indicators, and especially through financial market indicators. On the other hand, preliminary performance analysis, based on return on common equity, had shown that Stark got very close to the leaders performance level in 2012. However, a deeper analysis of Stark's sources of performance casted a shadow of doubt on long-term sustainability in performance of Stark. In other words, for Stark to catch up with leader's performance level in the future, it must seriously deal with possibilities of improvement of its gross profit margin, finding means from increasing sales and cutting costs of material and purchase value of goods sold. We should not forget that Bambi as a leader will at the same time continue to improve its own results, if it manages to keep the previous year trend. Consequently, this continuous performance improvement competing game will potentially result in reaching excellence in the industry as a whole and strengthen its competitiveness on the international market.

Through the elaborated analysis, we have confirmed that financial benchmarking can be used as a tool in different types of organizations, including the agricultural sector, and that it can give very useful indices about the actions which needs to be undertaken in order to improve company's performance in the future. Additionally, we have shown that financial benchmarking performed using only publicly available data is a very cost-effective tool, having in mind that all the necessary information for the analysis can be obtained with minimal effort and free of charge.

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FINANSIJSKI BENČMARKING NA PRIMERU PREDUZEĆA KONDITORSKE INDUSTRIJE

***Marina Vasilić*[2]**

Summary

*Kao upravljačka alatka dokazane efikasnosti kada je reč o upravljanju preduzećima u kriznim vremenima, benčmarking koncept još uvek je nedovoljno poznat i primenjen u Republici Srbiji. Cilj ovog rada bio je da rasvetli mogućnosti benčmarking koncepta, i to kroz aspekt finansijskog ben*čmarkinga, odnosno da izloži *jednostavnost njegove upotrebe i koristi koje pruža ovaj koncept, čak i sa aspekta eksternog analitičara. U tom smislu, analizirana su dva najveća konkurenta na tržištu konditorskih proizvoda Republike Srbije, korišćenjem javno dostupnih informacija o njihovom poslovanju. Pomoću višedimenzionog seta merila performansi baziranih na dobitku kao vrhovnom cilju, a uzevši u obzir i vrednost za vlasnike, likvidnost i kapitalizaciju, potvrdili smo tržišni položaj lidera i pronašli pokretače njegovih performansi, odnosno ključne zadatke koje pratilac treba da savlada kako bi unapredio sopstvene rezultate.*

Ključne reči: *benčmarking, analiza performansi, konditorska industrija, kontinuirano učenje.*

2 Marina Vasilić, Master Ekonomista, Asistent, Univerzitet u Beogradu, Poljoprivredni fakultet, Nemanjina 6, 11080 Zemun, Srbija, Telefon: + 381112612664, E-mail: marina.vasilic@agrif.bg.ac.rs

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ANALYSIS OF LEGAL AND ECONOMIC ASPECTS OF PRECIPITATION WEATHER DERIVATIVES FOR SERBIAN AGRICULTURAL SECTOR[1]

Janko Veselinović[2], Todor Marković[3], Stanimir Đukić[4]

Summary

Weather derivatives are not present in Serbia nor in the neighbouring countries and have no significant application in the European Union, either. Weather derivatives originated in the USA, where the market for these instruments is most developed, in terms of both economy and law. However, positive effects of their application, through the decrease of influence of unfavourable weather conditions on agricultural crops, are a good basis for their further study. The most common reasons for their absence from our financial market are their complexity and the inexistence of prerequisites for their introduction. This paper analyses legal and economic aspects of weather derivatives, as forms of financial derivatives, as well as weather derivative contracts concluded with the aim of hedging against precipitation exposure. The goal of the analysis is to find an optimal contract structure, but also the conditions that have to be met in order for its signing to be economically justified for both contractual parties, as well as the creation of preconditions for this weather derivative contract to be the instrument of trade on the financial market. The paper also analyses normative frameworks for the conclusion of these derivative contracts, as well as the necessity to educate market participants,

1 The paper is a result of the research conducted within the project III-46006 of the Ministry of Education, Science and Technological Development of the Republic of Serbia titled *Sustainable agriculture and rural development in order to achieve strategic goals Republic of Serbia in the Danube region* and the project No. 47024 of the Ministry of Education and Science titled *Social relations of Serbs and Croats, national identity and minority rights from the aspect of European integration*.

2 Janko Veselinović, Ph.D., Associate Professor, University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 21 485 33 78, E-mail: veselinovic.janko@gmail.com

3 Todor Marković, Ph.D., Assistant Professor, University of Novi Sad, Faculty of Agriculture, Department of Agricultural Economics and Rural Sociology, Trg Dositeja Obradovića no. 8, 21000 Novi Sad, Serbia, Phone: +381 21 485 34 19, E-mail: todor@polj.uns.ac.rs

4 Stanimir Đukić, M.A., Ph.D. student at EDUCONS University, Faculty of Business Economy, Vojvode Putnika Street no. 87, 21208 Sremska Kamenica, Serbia, Phone: +381 64 892 48 81, E-mail: stanimirdj@hotmail.com

which refers both to agricultural producers and financial institutions. Furthermore, it emphasizes the difference in relation to the classical contract of insurance against drought risk.

Key words: *hedging strategies, precipitation quantity, weather derivatives.*

JEL: *Q12*

Introduction

Recent years have seen significant development of money market in Serbia and great progress has been made in the period 2000-2007, due to a significant liberalisation. Particular results were achieved in the field of money management. It is evident that foreign banks had a significant positive influence over such trends through a wide range of services offered to clients. There is certainly enough space left to improve the existing state and one of the ways to do so would be to introduce financial derivatives on the Serbian market.

Positive theories to explain financial risk management require a considerable number of assumptions concerning the objective of management (Benson and Oliver, 2004). The use of derivative instruments in corporate risk management has grown rapidly in recent years, caused partly by financial deregulation and partly by the success of the financial industry in designing a great variety of OTC and exchange-traded contracts (Fender, 2000). Financial derivatives (i.e. financial innovations) are, in fact, contracts traded on the stock market, like securities, the price of which depends on the price variations of securities or other assets derived from their active basis (i.e. underlying assets), (Carić et al., 2011). According to our law, financial derivatives can be a subject of public offering if they are approved by a decision of the stock market approved by the Committee on Payment and Settlement Systems (Veselinović, 2011).

Weather is undeniably one of the most important sources of risk in agriculture, and it seems that fluctuations of temperature and precipitation have even increased in the last decade due to global climate changes (Karl and Trenberth, 2003). Weather derivatives are a special kind of financial derivatives, the payment of which depends on a weather-related parameter. Weather derivatives are defined as futures contracts or futures contract options based on the weather index (precipitation amount, temperature, wind, frost, etc.) obtained by quantifying the deviation of weather conditions from the chosen point of reference. Weather derivatives were created to allow a transfer of risk of unfavourable weather conditions onto third persons that have the possibility to manage them efficiently. They are financial instruments that are not derived from the price of goods or some other financial category as a base value, but take weather variables, such as temperature or precipitation amount, instead (Marković and Jovanović, 2011a). Weather derivatives appeared at the end of the nineties, when financial experts began quantifying and indexing weather through monthly and season averages, then related those indexes to dollar value and started trading those packages (weather derivatives) on the stock market.

Prior to that, this kind of trade was known in trade of indexes of other kinds (currencies, interest rates and agricultural goods). "The first weather transaction in 1996 opened the field of weather risk management, the value of which grew in the first several years of trade to over five million euro. From that moment on, financial anxiety due to unprofitable weather has become a commodity and, as such, placed the fear of ordinary, non-financially expressed weather under financial control (Janković, 2014)." The basic goal of weather derivatives is to reduce the uncertainty related to weather conditions in the future. Weather derivatives differ from the classical ones in that their purpose is to protect from a change in quantity (not the price) of goods and services offered by companies. The basis of other types of derivatives, thus, lies in assets or a commodity that is of value by itself, i.e. which is physically marketable (Ali, 2000). In this way, by means of these financial instruments, weather conditions are turned into a commodity (Marković, 2013; Janković, 2014). Companies use weather derivatives to protect themselves from unfavourable weather conditions, most often to smooth revenues, cover excess costs, reimburse lost opportunity costs, stimulate sales and diversify investment portfolios (Leggio, 2007).

Increase of certainty in agricultural production is one of the most important goals of every agrarian policy. In Serbian circumstances, uncertainty is reflected in unpredictability of prices of agricultural products, impossibility of marketing and collection of receivables, as well as insecurity reflected in insolvency of the warehouse owners and other economic risks. However, a specific uncertainty in agriculture is related to natural disasters, which, due to global climate changes, become significant risks. Some of them (drought, flood and hail) have had a significant impact on the crop yield and, in some cases, completely destroyed crops and fields. In addition to significant improvement in meteorology, weather conditions are still impossible to foresee in detail and much less to prevent. It is certain that Serbia has no adequate agrarian policy that would prevent the consequences of climate change and, on the other hand, nowhere nearly enough resources to cover or mitigate the damage resulting from it. In the past, insurance houses have avoided insuring against certain kinds of risk or have set, through their general and specific conditions, serious obstacles to potential policyholders.

On a global level, financial derivatives are also present as a model for increasing certainty in agricultural production. On the other hand, Serbian stock market still does not have all prerequisites for the introduction of financial derivatives into stock market offer (Veselinović et al., 2014). The goal of this paper is to shed some light on the problems related to introduction of financial derivatives, i.e. futures contracts, as their manifestation, into Serbian economic and legal system, thus creating conditions for their introduction into stock market offer. In order to gradually introduce financial derivatives and futures contracts into one of the Serbian stock markets, it is necessary for this type of business to gain recognition, as well as to recognise its difference from other similar legal institutions, such as insurance contract.

Material and methods

Scientific papers on the topic of financial derivatives (weather derivatives in particular) are very few in Serbia and there is a complete absence of integral research studies with analysis

of stock markets, investment companies and agricultural producers, as potential participants in this market. The paper uses relevant sources by Serbian authors who dealt with theoretical and practical aspects of application of weather derivatives, as well as the sources by foreign authors. Hence, this paper uses the comparative legal method and comparative economical method to compare the experience of other countries and Serbian legislation and practice in this field. Starting from the economic and legal institutes in other countries, conclusions were made on their position in Serbian legislation or absolute exclusion and their inexistence in practice. The paper includes an analysis of weather derivatives with a more detailed analysis of weather derivative contract, which is based on a smaller amount of precipitation. The paper also analyses legal framework related to this field.

Results and discussion

Conditions for introduction of weather derivatives onto Serbian financial market

Weather derivatives, like financial derivatives in general, were made as an answer to the growth of risk on the market, but they can also present a significant source of numerous dangers. Hence the role of the state is very important in order to promote use of weather derivatives for hedging strategies, instead of potentially leading to new risks, primarily on the financial market. Weather derivatives create such conditions that the consequences of negative climate fluctuations do not greatly reflect on the total profit generated from production, which is particularly true in agriculture. In Serbia, as a rule of thumb, negative climate conditions lead to the growth of basic products, thus increasing prices in the production and market chain.

Seeing as weather derivatives are based on the concept of futures stock market contract, i.e. that with a time distance between the moment it is signed and the moment of its fulfilment, contractual fulfilment can be traded in the interim period. Payment or settling is done upon the fulfilment of futures contracts, with the traders paying the positive or negative difference arising from the business (Gardner, 2003).

The paper treats the lack of precipitation in the previous years as the object of the weather derivative contract. Taking into account any crop (such as mercantile corn), it is required that, apart from the regulatory conditions, we also have a stock market institution specialised in such trade. On the other hand, existence of stock market participants is required, both sellers and buyers of the futures contracts, trading in weather conditions as a commodity. In order to entirely apply a futures contract, for someone to merely make a "futures" purchase of "weather conditions", does not suffice, but also to allow someone to potentially buy out a futures contract, accepting the risk of "weather conditions". A stock market trade of a certain weather derivative is not necessary, as these contracts can also be traded out of stock markets (Marković and Jovanović, 2011b). It is evident that the futures trade can have a speculative character, thus the role of states is very important. In this field, appropriate directives of the EU are instructive, as well as the recommendations of the Bank supervision committee of the International Payment bank in Basel.

Analysis of legal and economic elements of futures contracts, an example of insurance against an insufficient amount of precipitation

Anxiety caused by uncertain future, due to unpredictable climate conditions is known in the world of finances under the name of weather derivatives, which are stock market products aimed at weather trading. They are one of the instruments of protecting agricultural workers from a lower precipitation level compared to a multiannual average. This is realised by an agricultural producer signing a weather contract with an insurance company or another authorised financial organisation. In the economic sense, weather derivatives are isolated from the political and economic instabilities, hence there is no obstacle to trading weather derivatives on the Serbian market in the future, especially seeing as their price is not related to supply/demand ratio. On the other hand, legally, these instruments are a form of contingent, i.e. possible rights to other forms of financial assets, which can be reflected in financial compensation if contract conditions are met.

The first and the greatest market of weather derivatives is the Chicago Mercantile Exchange – CME, which allows trading in a majority of agricultural products. The table also shows an overview of other stock markets trading in weather derivatives with a list of offered products (Table 1).

Table 1. World futures and options market in agricultural commodities

Exchanges	Location and Date of Establishment	Agricultural Products Offered
Chicago Board of Trade (CBOT)	Chicago (1848)	Corn, soybeans, soybean oil, soybean meal, wheat, oats, rough rice, mini corn, mini soybeans, mini wheat
Kansas City Board of Trade (KCBOT)	Kansas (1856)	Wheat
New York Board of Trade (NYBOT)	New York (1870)	Cocoa, coffee, cotton, FCOJ, sugar
Chicago Mercantile Exchange (CME)	Chicago (1874)	Beef, dairy, e-livestock, fertilizer, hogs, lumber
Minneapolis Grain Exchange (MGE)	Minneapolis (1881)	Wheat, hard winter wheat index (HWI), soft winter wheat index (SRI), spring wheat index (SWI), national corn index (NCI), national soybean index (NSI)
Sydney Futures Exchange (SFE)	Sydney (1960)	Wool, New Zealand Broad Wool, MLA/SFE cattle
Winnipeg Commodities Exchange	Winnipeg (1972)	Canola, Barley, Flaxseed, Feed wheat
South African Futures Exchange (SAFEX)	Sandown (1988)	White maize, yellow maize, wheat, sunflower seed, soybeans
Budapest Commodity Exchange	Budapest (1989)	Corn, wheat, feed barley, rapeseed, soybean, sunflower seed

Exchanges	Location and Date of Establishment	Agricultural Products Offered
Poznan Commodity Exchange	Poznan (1991)	Corn, wheat, sugar
Warenterminbörse	Hanover (1998)	Hogs, piglets, potatoes, wheat, brewing barley
Euronext.liffe	London, Paris, Amsterdam, Lisbon & Brussels (2000)	Cocoa, Robusta coffee, white sugar, feed wheat, milling wheat, rapeseed, corn, potatoes

Source: Battley, 1999.

Serbian Law on the Capital Market (*Zakon o tržištu kapitala*) defines the following financial instruments: "Options, futures, swaps, forward rate agreements and any other derivative financial instruments relating to climatic variables, freight rates, inflation rates, emission allowances or other official economic statistics that must be settled in cash or may be settled in cash at the option of one of the parties …" (Law on the Capital Market, 2011, Article 2, paragraph 1, item 1, sub-item 10).

Jobs related to offer and sale of financial instruments, without obligatory buyout are classified, according to Serbian legislation, under investment services and activities and can be performed by qualified investors that fulfil legal conditions. Those are legal entities, that are authorized by a relevant supervisory body or are subject to supervision on a financial market including: credit institutions, investment companies, other financial institutions whose operations are approved or supervised by a relevant supervisory body, insurance companies, collective investment undertakings and their management companies, pension funds and their management companies, dealers in commodities (Law on the Capital Market, 2011, article 14).

Weather derivative contracts are classified under the financial derivative group of contracts and their legal nature is informal, seeing as their form is not standardised in positive laws. This means that, when signing of such a contract, it is important that it contain such elements as enable it to be fulfilled, as well as that it be harmonised with the national legal system. It is also important to take into account the Securities Act (*Zakon o tržištu hartija od vrednosti i drugih finansijskih instrumenata*), (2006), as well as the Law on Banks (*Zakon o bankama*), (2005) and the Law on Investment Funds (*Zakon o investicionim fondovima*), (2006), etc. If weather derivative contracts were to be made, they, with the presumption that they would be traded on the stock market, they would have to be formalised, seeing as stock markets of financial derivatives trade in formal derivatives, exclusively. If a contract was made for trade on a non-stock market, it could be tailored completely according to user needs. The first derivative contracts in the world appeared in non-stock markets, as privately arranged business between two parties, hence it can be expected that in the future, these contracts will appear on our market, too, in the same way. Similar contracts from comparative law could be taken as

models, although their incorporation should be carefully planned, seeing as they need to be realised within our legal systems and by existing subjects in the financial market.

The paper covers weather derivatives that are based on insufficient precipitation compared to the referential multiannual average. In this way, weather contracts based on excessive precipitation, as well as other contracts related to other weather parameters could be considered (wind, snow, cloudiness, etc.). As for the application of weather derivatives, certain authors claim that it most commonly lies in insurance of those crops that give markedly high yields or those significantly represented in the overall structure of sowed fields (Marković, 2013).

In order to trade in weather derivatives, a standardised contract needs to be created. On the one hand, buyers of climatic variables (precipitation amount) can be companies, agricultural cooperatives, entrepreneurs, registered agricultural holdings or even a physical person that has not registered an agricultural holding. This can be any legal or physical person with the interest in insuring against uncertainty of insufficient precipitation that could adversely affect the yield. Individual agricultural holding from Đurđevo can be taken as an example, with their official address and other data. On the other hand, a seller of climatic variable could be any legal person registered for doing trading business with financial derivatives. Investment fund from Belgrade, with their official address and other data can be taken as an example.

Weather derivative contracts have a point of activation of obligations of contractual parties, which means that one or the other party "gains" an obligation only after it has been established, on the basis of observation of recorded precipitation on a referential weather station, that the precipitation quantity is below or under certain reference values. Contract on weather derivatives needs to have a clearly established contract subject, which could be: Payment of certain sum due to insufficient precipitation in the referential measurement period (e.g. 01.V-31.VIII) in relation to referential multiannual precipitation for a particular crop[5] (e.g. commercial corn) of an agreed area in the cadastral community of Đurđevo. The contract must precisely establish what is meant by insufficient precipitation amount.
Seeing as climatic variables cannot be traded separately, they need to be quantified. In this example, it refers to the precipitation amount in mm. We thus obtain the index, which can be an object of trade. In later text, elements necessary for index determination are cited. In the contract it would be necessary to define the way precipitation amount is calculated if,

5 When defining the contract subject, a referential multiannual average precipitation (for the same period) needs to be established. It is determined for every risk zone (that can precisely match the cadastre unit) and established on the basis of multiannual daily precipitation index, as officially recorded by the Republic Hydro-meteorological Service. Referential multiannual average precipitation refers to the product of coefficient of 1.45 and average values of 10 lowest precipitation amounts recorded during the referential period, for each year from 1961 to 2014, based on data made available by the Republic Hydro-meteorological Service and rounded down to one decimal place. Referential multiannual precipitation amount is determined for each individual referential time period and every single zone of drought risk, separately (special circumstances for crop and yield insurance against drought risk, Generali Insurance, Serbia a.d.o., 2014).

for any reason, no data on daily precipitation is recorded on any certain day at a referential weather station during the period of measurement or if it is not available in official reports of the Republic Hydro-meteorological Service, alternative piece of data can be defined as a piece of data from an alternative weather station, which can be the nearest one. The contract can define the said alternative place, as well. If precipitation amount cannot be established in this way, either, multiannual average daily precipitation for that day can be used based on 10-year records for that day at that weather station.

One of the elements of the contract should define the referential weather station, i.e. the referential climatological or weather station of the Republic Hydro-meteorological Service. It must belong to a specific cadastral municipality defined on the policy or to the territory of the neighbouring cadastral municipality. It is possible for one contract to contain more weather stations for different parcels, thus more risk zones, as well. It is also possible to separate the contracts according to weather stations and risk zones.

Within the referential period, times when precipitation is measured also need to be defined. These can also be termed measurement periods. Measurement periods are most commonly taken as periods of 10 to 11 successive days during a calendar month and they are defined in such a way that each calendar month contains three measurement periods. Thus, within a referential time period, we have more measurement periods. Referential precipitation amount is a sum of all referential precipitation amounts in the measurement period during the referential time period at the climatological station of the Republic Hydro-meteorological Service.

Another important contract element is the price payable by the buyer of the climatic variable to the seller, as a premium used to insure against the insufficient precipitation. During the construction of the weather derivatives, the key question is setting the risk price (fair premium) that the buyer is ready to pay for the risk transfer. Premium paid depends on the type and structure of the weather derivative (Marković, 2013). Premium, as a rule, is established according to the area cultivated and could be subject to agreement between the parties, but some already established rules are used instead. In order to define the premium, the method of simulation based on long-term data is used, where the fair premium equals the discounted expected value of payment from the weather derivative (Marković and Jovanović, 2011b). The question of payment arising from the weather is established in the following step and the very discount process is used to calculate the value of the future payment for a certain moment in the past (establishing the current premium value on the basis of the payment expected in the future).

The following element of the contract would be the compensation paid by the seller of the weather variable to the buyer for an insufficient precipitation amount in relation to the referential precipitation of the previous years. It is important to establish what the border level is, as it marks the index value that triggers the payment. This compensation could be defined according to millimetres of precipitation level below average. An important aspect is also that of the function of payment, which brings the established index into cash flow or to payment of a certain overall money value (Marković and Jovanović, 2011b).

Thus, for example, if the referential multiannual precipitation amount is 100 mm and the yearly precipitation amount in the chosen period is 80 mm, the seller should pay the buyer for the precipitation level difference (20 mm) multiplied by the money value of 1 mm of precipitation, as determined by contract. In this weather contract, precipitation differences payable by the seller could also be defined in a different way. This is precipitation difference between the referential multiannual precipitations and precipitations in the referential period. It can be explained on a following example: for every 10 mm less precipitation, a certain sum is paid, for every 20 mm less precipitation, another, larger sum, is paid, and so on, until the previously agreed maximum payment (e.g. 50 mm less precipitation). The contract limits the maximum payment below or above the defined index value. The compensation scale is thus defined in relation to the "drought" intensity.

A referential multiannual precipitation amount is a starting point for "defining" mathematical difference in relation to precipitation amount that the contract defines. The contract also needs to define the way of establishing a referential maximum precipitation amount in the measurement period, i.e. the insurance period. The referential maximum precipitation amount in the measurement period is the amount of precipitation during the measurement period (cumulative for the measurement period). If during a measurement period greater amounts of precipitation than the defined maximum are recorded (extreme showers, torrential rains etc.), the upper limit is defined as the maximum precipitation amount in the measurement period. Referential maximum precipitation amount in the measurement period is determined for every risk zone separately.

As all other contracts, weather derivative contract should also contain basic elements, including the time and place of signing and the competent court or arbitration court (Table 2).

Table 2. Weather derivatives contract

WEATHER DERIVATIVE CONTRACT	
Signatory parties	
Agricultural holding of Jovan Petrović	Delta investment
Marka Popovića 44, Đurđevo, Serbia	Koče Racina 3, Belgrade Serbia
(Buyer of the climatic variable)	(Seller of the weather variable)

Article 1.
Subject of the contract
The subject of this contract is the payment of financial compensation by the Seller of the weather variable to the Buyer of the weather variable due to an insufficient precipitation amount in the referential measurement period, pertaining to the parcels (parcel cadastral number) in the cadastral community of Đurđevo with the total area of 150 ha on which mercantile corn will be sown in 2015. The basis for payment is the difference in precipitation amount in the referential measurement period of 01.V 2015 to 31.VIII 2015 in relation to the referential multiannual precipitation amount in the period of 01.V 2015 to 31.VIII 2015 in the area of cadastral community of Đurđevo.

Article 2.

Referential period

Referential measurement period is from 01.V 2015 to 31.VIII 2015 in relation to referential multiannual precipitation amounts in the period of 01.V 2015 to 31.VIII 2015. The referential multiannual precipitation amount is the product of the coefficient of 1.45 and the average value of 10 lowest precipitation amounts measured during a referential time period, for each individual year in the period from 1961 to 2014, based on the data of the Republic Hydro-meteorological Service and rounded down to one decimal place.

The contract defines what insufficient precipitation is.

Article 3.

Referential weather station

Referential weather station, climatological station or meteorological station of the Republic Hydro-meteorological Service is the station n. 746 in the cadastral community of Đurđevo on the parcel (parcel No).

If, for any reason, no data on daily precipitation is recorded on any certain day at a referential weather station during the period of measurement or if it is not available in official reports of the Republic Hydro-meteorological Service, data from the alternative weather station nearest to the cadastral community of Žabalj, which is located on the parcel (parcel No). If the precipitation quantity cannot be established in this way, either, multiannual average daily precipitation for that day (based on ten-year records for that day at the weather station of the cadastral community of Đurđevo) will be taken as an additional alternative piece of data on daily precipitation amount.

Article 4.

Premium

The Buyer of the climatic variable pays the variable Seller the premium used to insure against a smaller precipitation amount in the amount of .....RSD per ha, to a total of .....RSD. The Premium is payable on defined dates: (define the dates of premium payments)

Article 5.

Compensation for insufficient precipitation

The Seller of the weather variable shall pay the compensation to the Buyer of the weather variable for an insufficient precipitation amount in relation to the referential precipitation in the previous years, if conditions of the precipitation border level are met, in the following way: Border level for compensation is 20 mm less precipitation in relation to the referential multiannual average. For every mm of precipitation below the borderline, the Seller of the weather variable shall pay the Buyer of the sum of .....RSD per ha, to a total of .....RSD. A total compensation is defined according to the following formula: smaller precipitation amount in mm x .....RSD per mm x number of hectares = overall compensation sum .....RSD. Maximum payment is up to 50 less mm of precipitation in relation to the multiannual average, which means that the Seller of the weather variable is obliged to pay the compensation only up to that value index.

Article 6.

Referential index

Referential index for compensation for smaller precipitation amounts is less precipitation (rainfall) per mm, below the border level of 20 mm in relation to the multiannual referential precipitation level at the defined weather station.

Article 7.

Index trade freedom

Signatory parties agree to a free trade of this contract, i.e. its referential index on the stock and non-stock markets.

Article 8.

Settlement of disputes

In order to settle disputes arising from this contract, the competent arbitration is ad hoc, as defined by the signatories in that each signatory will name an arbitrator, with those arbitrators naming the third one, who will preside over the ad hoc arbitration. The ad hoc arbitration decision has the validity of an enforceable court judgment. Ad hoc arbitration will adhere to the rules of the Foreign trade arbitration of the Serbian Chamber of Commerce.

Article 9.

Number of copies of the contract

The contract is concluded in 4 (four) copies, of which each signatory retains 2 (two) copies.

Article 10.

Time and place of contract conclusion

The contract is concluded in Belgrade on 17.10. 2014.

Buyer of the weather variable	Seller of the weather variable
Signature	Signature

Source: Established by author's

Differentiation of weather contract from insurance contract

The basic difference between the weather derivative contract on purchase of "weather future", based on the prevention of risk of insufficient precipitation amount (drought) and the contract of drought insurance is reflected in the fact that with weather contracts, the important factor is not the extent of drought damage, but the precipitation amount smaller than the multiannual referential period. As opposed to the weather contract, with insurance contract, the fact that the referential precipitation amount is lower than the referential multiannual precipitation amount is only the prerequisite to begin the damage assessment and only if it is established that in the zone insured against the drought risk there was a decrease of the agreed yield (most often more than 10%), the damage compensation is paid. Thus for both the seller and the buyer of the weather

contract, when it comes to the payment of compensation, the real drought damage is unimportant, but it is important that the precipitation amount for the agreed period was less than the multiannual referential period.

In this regard, this weather contract is equally speculative as any other financial derivative. Trading in these financial derivatives carries a risk that is difficult to foresee. Seeing as the results of purchase of this weather contract are related to an unknown future event (the amount of rainfall on these parcels), it is not difficult to conclude that each purchase and sale of a weather contract is in itself a significant risk. This makes it speculative by nature, which does not mean that trading in these financial derivatives is always speculative from the aspect of intent of its participants. Classical insurance does not recognise the possibility of existence of speculators, seeing as speculation is a sanctioned offense in insurance business.

On the other hand, according to the Securities Act, article 3, the financial instruments do not include insurance and reinsurance policies and other products of insurance companies. The insurance contract, although *sui generis*, is classified under commodity trade. The very legal definition of insurance contract makes a clear difference in relation to other similar jobs. "By a contract of insurance a negotiator of insurance shall assume the obligation to pay a specific amount to an insurance organisation (insurer), while the organisation shall assume the obligation, should an event take place which represents the case covered by insurance, to pay to the insured person, or to a third party, compensation, the stipulated amount, or to do something else" (the Law of Contract and Torts), 1978, article 897). The mutuality and solidarity are not immanent to weather derivatives, as the fact that compensation is paid regardless of the extent of damage and without the estimate of that damage shows that it is a legal form based on other principles. Weather derivatives are thus a special category of financial instruments.

It is apparent that it must be admitted that weather derivatives that are used to insure crops against insufficient precipitation amount or other adverse weather conditions contain many elements of insurance contracts. This makes these two legal forms similar and it is important to emphasize the differences that make these two contracts and legal forms different. From the economic point of view, the difference between weather contracts and insurance contracts is that "weather derivatives cover harmful events of low-risk level, but of high probability of occurrence, while insurance covers harmful events of high-risk level, but of low probability of occurrence" (Marković, 2013). In this respect, weather derivatives, unlike insurance, presume that a temperature deviation of merely several degrees Celsius or several mm of precipitation can endanger yields and income.

Conclusion

On the basis of analysis of regulations and state of stock markets in Serbia, one could conclude that there are still no conditions necessary for the application of weather derivatives and their presence on this stock market. In order to create conditions for their use, primarily in terms of weather derivative contracts, it is necessary to realise numerous preconditions. It is of primary

importance to research and survey the opinions of the national stock markets and the attitudes of the national investment companies on basic indicators related to weather derivatives. In addition to that, it is important to acquaint potential users with the economic and legal aspects of weather contracts, including the creation of standard contracts for weather derivatives. Insufficient knowledge on weather derivatives entails a high level of standardisation of weather derivatives in order to create conditions for their faster introduction to the market. On the other hand, it is necessary to create adequate technical preconditions on the stock market, but also enable the specialisation of certain investment funds in order to operate with them.

It can be concluded from the analysis that it is necessary to shed some additional light on economic effects of introduction of weather derivatives on capital market in the field of agricultural products. It is also very important to get both sellers and buyers interested in such financial arrangements. The basic precondition for this is the expansion of knowledge on these financial instruments through counselling, seminars, education, etc., as well as through the creation of requirements through additional equipment of stock markets and other financial institutions.

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ANALIZA PRAVNIH I EKONOMSKIH ASPEKATA VREMENSKIH DERIVATA KOD PADAVINA U SRBIJI U POLJOPRIVREDNOJ OBLASTI

Janko Veselinović[6], Todor Marković[7], Stanimir Đukić[8]

Rezime

Vremenski derivati nisu zastupljeni u Srbiji i njenom okruženju, a nemaju primenu u značajnoj meri ni u Evropskoj uniji. Mesto njihovog nastanka, ali i ekonomskog i pravnog razvoja su SAD. Međutim, pozitivni efekti njihove primene, kroz smanjivanje uticaja nepovoljnih vremenskih prilika na poljoprivredne useve, predstavljaju dobro osnovu za dalje njihovo izučavanje radi moguće primene u praksi. Najčešći razlozi njihovog neprisustva na našem finansijskom tržištu su njihova složenost, ali i nepostojanje pretpostavki za njihovo uvođenje. U ovom radu se analiziraju pravni i ekonomskih aspekti vremenskog derivata, kao vrste finansijskih derivata, kao i vremenskog derivativnog ugovora koji se zaključuje sa ciljem smanjivanja neizvesnosti usled manje količine padavina. Cilj analize je odgovor na pitanja koja se tiču strukture ugovora, ali i uslova koji moraju da budu ispunjeni da bi njegovo zaključivanje imalo ekonomsku opravdanost za obe ugovorne strane, ali i stvaranje uslova da taj vremenski derivat, u formi ugovora, bude predmet trgovine na finansijskom tržištu. U radu se analizira i normativni okvir za zaključenje ovih derivativnih ugovora, ali i neophodnost edukacije učesnika na tržištu, što se odnosi i na poljoprivedne proizvođače i na finansijske institucije koje bi ovim poslom mogle da se bave. Takođe, naglašava se i razlika u odnosu na klasični ugovor o osiguranju od rizika suše.

Ključne reči: *hedžing strategije, količina padavina, vremenski derivati.*

6 Prof. dr Janko Veselinović, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Trg Dositeja Obradovića 8, 21000 Novi Sad, Republika Srbija, Telefon: +381 21 485 33 78, E-mail: veselinovic.janko@gmail.com

7 Doc. dr Todor Marković, Univerzitet u Novom Sadu, Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede i sociologiju sela, Trg Dositeja Obradovića 8, 21000 Novi Sad, Republika Srbija, Telefon: +381 21 485 34 19, E-mail: todor@polj.uns.ac.rs

8 Stanimir Đukić, M.A., doktorant, Univerzitet EDUCONS, Fakultet poslovne ekonomije, Vojvode Putnika 87, 21208 Sremska Kamenica, Srbija, Telefon: +381 64 892 48 81, E-mail: stanimirdj@hotmail.com

IN MEMORIAM

Prof. dr Borislav (Avram) Radovanović

(05. 12. 1922. – 24. 07. 2014.)

Po povratku sa godišnjih odmora, zatekla nas je vest da je 25. jula 2014. godine umro prof. dr Borislav A. Radovanović, najstariji doktor agroekonomskih nauka i profesor za oblast agroekonomije u Srbiji, koji je svoj radni vek - od 8. oktobra 1949. do 31. decembra 1987. godine - posvetio ne samo studentima, asistentima, magistrantima i doktorandima na Poljoprivrednom fakultetu Univerziteta u Beogradu, već i na Veterinarskom fakultetu u Beogradu, Višoj poljoprivrednoj školi u Šapcu i Poljoprivrednom fakultetu Univerziteta u Sarajevu, kao i poljoprivredi, posebno zadrugarstvu i selu u Srbiji.

Rođen je 5. decembra 1922. godine u Beogradu. Zbog očevog službovanja u različitim mestima, Gimnaziju je završio 1942. godine u Jagodini.

U Narodno-oslobodilačkoj borbi učestvovao je od 1. novembra 1944. do 15. maja 1945. godine, a zatim je bio u JNA do 17. oktobra 1945. godine.

Tadašnji Poljoprivredno-šumarski fakultet u Zemunu, Opštu proizvodnu grupu, upisao je 1945. i diplomirao 19. septembra 1949. godine. U toku studija, u Zborniku studentskih radova za 1949. godinu objavio je rad pod naslovom *Reorganizacija zemljoradničkog zadrugarstva u NR Srbiji* – što je kasnije i opredelilo tematiku većine njegovih naučnih i stručnih radova i istraživačkih projekata.

U toku studija bio je učesnik dve višemesečne radne akcije na izgradnji pruga Brčko – Banovići (1946) i Šamac – Sarajevo (1947).

Neposredno posle diplomiranja (1949), postavljen je za mlađeg agronoma – pripravnika na Poljoprivrednom fakultetu Univerziteta u Beogradu, a 1950. godine i za asistenta na istom Fakultetu.

Tokom 1951. i 1952. godine bio je 10 meseci na praksi u Poljoprivrednom dobru „Čoka“ u Čoki.

Oženio se suprugom Ankom iz familije Vukmirović iz Bara, sa kojom ima kćer Vericu i sina Dragoljuba.

U zvanje asistenta reizabran je 1953. godine.

Posle reizbora (1954) bio na tromesečnoj specijalizaciji u SAD radi usavršavanja iz

predmeta *Food and Agricultural Politics* i *Economic Development of Underdeveloped Countries*.

U 1956. godini obavio je na četvoromesečnu specijalizaciju u FAO za oblast „Poljoprivredna ekonomika i statistika", za primenu statističkih metoda u predmetima *Marketing*, *Suply and Demand*, *Agricultural Economic*, *Price Polisy* i *Method of Corelation Analysis*.

U zvanje asistenta za predmet *Zadrugarstvo sa agrarnom politikom,* ponovo je reizabran 1956. godine. U referatu koji su potpisali profesori Branislav Milosavljević i Dr Zoran Pjanić, istaknuto je da je „Borislav Radovanović, pored dve specijalizacije u SAD (1954) i FAO (1956), učestvovao u pripremi i realizaciji anketnog istraživanja individualnih gazdinstava u srezu Požarevačkom, obradio dve teme za predavanja (*Feudalni odnosi u poljoprivredi* i *Reonizacija poljoprivrede*) i sa doc. Jaroslavom Ševarlićem objavio rad *Istraživanje utroška rada na Poljoprivrednom dobru „Vršački vinogradi" u 1952. i 1953. godini* (Organizacija rada br. 7, 1955).

Odlukom Fakultetskog saveta (1959) potvrđen je ponovni izbor Borislava Radovanovića za asistenta za predmet *Ekonomika poljoprivrede.*

Doktorsku disertaciju na temu *Ekonomsko-politički problemi komasacije zemljišta u NR Srbiji u 1952. i 1953. godini* odbranio je 1959. godine i,

Iste godine izbran je u zvanje docent za predmet *Osnovi ekonomije*, a članovi Komisije prof. Branislav Milosavljević i doc. dr Žarko Bulajić analizirali su šest radova dr Borislava Radovanovića i istakli da je držao nastavu na 10 obrazovnih dodiplomskih kurseva i na magistarskim studijama na matičnom Fakultetu, za pet generacija iz predmeta *Osnovi ekonomije* na Veterinarskom fakultetu i za dve generacije iz predmeta *Ekonomika poljoprivrede* na Višoj poljoprivrednoj školi u Šapcu. Istovremeno, bio je predsednik Fakultetske komisije za pomoć stranim studentima (koji su u to vreme činili oko 5% ukupnog broja studenata na Fakultetu) i predsednik Jugoslovenskog odbora za međunarodnu razmenu studenata agronomije.

U Referatu o izboru u zvanje vanredni profesor za predmet *Ekonomika poljoprivrede* (1964)*,* profesori Branislav Milosavljević, dr Stanko Mirić i Dušan Lopandić, detaljno su analizirali 10 naučnih radova doc. dr Borislava Radovanovića objavljenih u časopisu *Poljoprivreda i zadrugarstvo* ili kao posebne publikacije *Zadružne knjige,* zatim veći broj odrednica u *Ekonomskom priručniku za poljoprivredu* i studiju *Problemi uređenja društvenog zemljišta SR Srbije* - deo projekta Instituta za ekonomiku poljoprivrede u Beogradu. Za Agrarni institut u Zagrebu obradio je *Kretanja u socijalnoj i agrarnoj strukturi beogradskog prigradskog područja;* a za Studiju o regulaciji Velike Morave veći broj poglavlja (*Organizacija i uređenje zemljišta u hidrosistemu, Uloga i zadaci socijalističkih organizacija* i *Upravljanje hidromelioracionim sistemom*). Posebno je istaknuta velika aktivnost doc. dr Borislava Radovanovića u Privrednoj komori Srbije, Saveznom sekretarijatu za poljoprivredu i šumarstvo, Poljoprivrednoj banci, Institutom za ekonomiku poljoprivrede i Agrarnim institutom u Zagrebu.

U Izveštaju sa predlogom za izbor doc. dr Borislava Radovanovića u zvanje vanrednog profesora, Komisija je posebno istakla: „*Radovanović se, kako pokazuju njegovi radovi, bavi problemima razvitka naše poljoprivrede, a pre svega ulogom i metodima rada zemljoradničke zadruge na podruštvljavanju i unapređenju poljoprivrede. Njegovi radovi su uglavnom zasnovani na ličnim istraživanjima koje je obavljao ispitujući rad niza zemljoradničkih zadruga i drugih poljoprivrednih organizacija. Takav metod rada omogućio mu je da dobro upozna našu praksu, uoči pojave koje se dešavaju pri konkretnoj primeni naše agrarne politike i otkriva tendencije daljeg kretanja na selu i u poljoprivredi. On u svojim radovima proučava i rešava aktuelne probleme. Zbog toga je niz zaključaka njegovih proučavanja usvojen i danas je ili sastavni deo naše agrarne politike, ili se o problemima koje je istakao ozbiljno raspravlja.*“

U zvanje vanredni profesor dr Borislav Radovanović je reizabran 1970. godine, a u Referatu koji su potpisali profesori dr Mihailo Vučković sa Ekonomskog fakulteta i Milun Ivanović i Dušan Lopandić sa Poljoprivrednog fakulteta, posebno se ističe da je:

- izvodio nastavu iz predmeta na dodiplomskim studijama - *Ekonomika poljoprivrede* na biotehničkim odsecima i *Razvoj i organizacija zemljoradničkih zadruga* na Agroekonomskom odseku i iz *Ekonomike poljoprivrede* na magistarskim studijama na matičnom Fakultetu; kao i nastavu iz *Osnova ekonomije* na Veterinarskom fakultetu i na Višoj poljoprivrednoj školi u Šapcu;
- napisao udžbenik *Ekonomika poljoprivrede* (sa prof. dr P. Marković) i skripta iz *Osnova ekonomije* za studente Veterinarskog fakulteta;
- objavio 12 naučnih i 9 stručnih radova; i
- bio član Saveta Instituta za ekonomiku poljoprivrede u Beogradu i član Komisije CK SK za selo i zadrugarstvo.

Odlukom Fakultetskog saveta (1971), dr Borislav Radovanović je izabran i u najviše univerzitetsko zvanje - redovni profesor za predmet *Ekonomika poljoprivrede,* a istu su potpisali predsednik Saveta prof. dr Novica Mitić i dekan prof. dr Radojica Kljajić.

Prof. dr Borislav Radovanović je izuzetno dobro govorio engleski, a solidno francuski, nemački i ruski jezik. Zahvaljujući tome, bio je i učesnik značajnijih međunarodnih skupova na kojima je izlagao radove ili držao predavanja, kao što su:

- *Međunarodni simpozijum o integraciji poljoprivrede i industrije i ulozi zadruga*. Tel Aviv, Izrael (20-30.03.1969);
- *predavanja po pozivu FAO* o ulozi zadruga i unapređenju poljoprivrede Jugoslavije u Varšavi (Poljska) i učešće na sastanku *Međunarodnog centra za poljoprivredu i zadrugarstvo* u Ženevi (Švajcarska) (1-10.10.1969);
- *Kongres Međunarodnog zadružnog saveza*. Milano, Italija (15-20.09.1970);
- *Međunarodno udruženje za poljoprivredu i zadrugarstvo*. Beč, Austrija (10-17.05.1971);

- *Institut za agrarnu politiku.* Ninberg, SR Nemačka (2-7.08.1971);
- *Svetska konferencija o ulozi poljoprivrednog zadrugarstva u razvoju poljoprivrede*. FAO, Rim, Italija (22-29.05.1972);
- *Timirjazevska akademija.* Moskva, SSSR (15-23.08.1975);
- dva ciklusa predavanja *Poljoprivreda Jugoslavije* (Wageningen - Holandija i Pariz –Francuska; 24.10. - 23.11.1976); i (Wageningen – Holandija; 17-31.10.1977).

Najzad, iako je to nerado prihvatao, prof. dr Borislaav Radovanović je obavljao i rukovodne funkcije:

- šef Katedre ekonomike poljoprivrede i tržišta - u dva mandata;
- zamenik (1975) i direktor (1976) OOUR Institut za organizaciju i ekonomiku poljoprivrede i prehrambene industrije.

Prof. dr Borislav Radovanović je samoinicijativno podneo zahtev za sporazumni raskid radnog odnosa 31. decembra 1987. godine, a u penziji je poživeo još 26 godina, 4 meseca i 25 dana.

Na kraju, pored navedenih podataka o univerzitetskoj karijeri najstarijeg među trojicom mojih profesora i šefova Katedre, koji je i nastariji agrarni ekonomista ne samo na našem Fakultetu već i u Srbiji, želim da istaknem i ličnu zahvalnost *prof. dr Borislavu A. Radovanoviću* za svekoliku pažnju i pomoć koju mi je darivao od odbrane diplomskog i magistarskog rada kada je bio predsednik komisija, preko mentorske pomoći pri izradi doktorske disertacije, do brojnih pedagoških, istraživačkih i ličnih saveta tokom naše višedecenijske saradnje.

Ćerka Verica i sin Dragoljub i njihova deca Jelena, Sanja i Aleksa ostali su bez svog tate i deda Bore, a nastavnici i saradnici na Katedri ekonomike poljoprivrede i tržišta, Institutu za agroekonomiju i Poljoprivrednom fakultetu u Beogradu bez poslednjeg iz plejade velikih učitelja u oblasti agrarne ekonomije - prof. dr Borislava A. Radovanovića.

Komemorativna sednica je održana 20. oktobra 2014. godine na Poljoprivrednom fakultetu u Beogradu.

Neka je Hvala i Slava prof. dr Borislavu A. Radovanoviću za sve što je učinio za agroekonomsku struku i nauku i poljoprivredu i selo Srbije!

U Beogradu – Zemunu,

20. oktobra 2014. godine *Prof. dr Miladin M. Ševarlić*

DETAIL INSTRUCTIONS TO AUTHORS WITH TEMPLATE FOR THE ARTICLES THAT WILL BE PUBLISHED IN JOURNAL ECONOMICS OF AGRICULTURE

The ECONOMICS OF AGRICULTURE is an international scientific journal, published quarterly by Balkan Scientific Association of Agricultural Economists (BSAAE) in cooperation with Institute of Agricultural Economics Belgrade (IAE) and Academy of Economic Studies Bucharest (ASE), in which are published original scientific papers (double reviewed), review articles, pre-announcements, book reviews, short communications and research reports. Research reports and book reviews will be accepted after previous consultation/invitation with/from either a journal Editor, or Editor of the book review, in accordance with the journal submission criteria.

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Anđela Marković[2], Petar Petrović[3], Mirko Mirković[4]

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It is desirable that Summary contains up to 150 words, as well as to contain all essential paper elements, such as goal(s), used method(s), important results and general authors' conclusion(s).

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1 Paper is a part of research within the project no. III 46006 - Sustainable agriculture and rural development in the function of accomplishing strategic objectives of the Republic of Serbia in the Danube region, financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia. Project period: 2011-2014. ***This segment is not obligatory within the paper***.

2 Anđela Marković, Ph.D., Principal Research Fellow, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 444 444/int 112, E-mail: andjela.markovic@iep.bg.ac.rs

3 Petar Petrović, Ph.D., Full Professor, University of Belgrade, Faculty of Agriculture, Nemanjina Street no. 6, 11080 Zemun, Serbia, Phone: +381 11 222 222, E-mail: petar.petrovic@gmail.com

4 Mirko Mirković, M.A., Assistant, University in Belgrade, Faculty of Forestry, Kneza Viseslava Street no. 1, 11000 Belgrade, Serbia, Phone: +381 64 33 33 333, E-mail: mirko.mirkovic@yahoo.com

Introduction

Please strictly follow the instructions on article formatting, as well as styles provided in this template. Do not change font size, interspace between paragraphs and line spacing to insert more text into a conditionally limited number of pages.

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Table 5. The distribution cost of packaged goods from Subotica to retail-store objects

Indicators	Period			Total
	Month 1	Month 2	Month 3	
Distance crossed (km)	12.926	11.295	13.208	37.429
Fuel consumption (litre)	3.231	2.823	3.302	9.356
Value of fuel consumption (RSD)	242.378	211.790	247.653	701.821
Total time spend on touring (hour)	314	266	417	997
Value of total time spend on touring (RSD)	47.048	39.890	62.570	149.508
Number of tours	98	77	102	277
Toll value (RSD)	0	0	0	0
Number of pallets transported (piece)	1.179	976	1358	3.513
Total weight transported (kg)	602.600	429.225	711.116	1.742.941
Vehicle maintenance costs (RSD)	203.858	164.970	224.806	593.634
Lease costs (RSD)	480.938	454.214	565.784	1.500.936
Total sum (RSD)	974.222	870.864	1.100.813	2.945.899

Source: Petrović, 2012;
Note: Values within the table are calculated without Value Added Tax (VAT)

Graphs, dendrograms, diagrams, schemes and pictures should be entered within the text of article (do not use option Float over text) and numerated according to order of their appearance. Their titles have to be positioned immediately above the graph, dendrogram, diagram, scheme or picture to which they relate. Please, have in mind that all titles, sources and notes have to be written by identical style which was used for tables formatting. During the article writing please mark in the main text all calls to a certain graph, dendrogram, diagram, scheme or picture (*Graph 2*.). All graphs, dendrograms, diagrams, schemes and pictures within the paper have to fit the specified format of the page, as well as they have been centrally positioned. Photos and images are not desirable in the paper, but if they can not be avoided, please use an optimal resolution (low resolution can bring to pixelization and worn edges, while to high resolution only increase file size without any contribution to article readability).

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ŠABLON: NASLOV RADA (CENTRIRAN, TNR SIZE 12, BOLD, SVA SLOVA VELIKA, MAKSIMALNO DVA REDA)[1]

Anđela Marković[2], Petar Petrović[3], Mirko Mirković[4]

Summary

Poželjno je da rezime sadrži do 150 reči, te da sadrži sve bitne činjenice rada, poput cilja rada, korišćene metode, najvažnijih rezultata i osnovnih zaključaka autora.

Tokom pisanja rezimea treba koristiti slova Times New Roman (TNR), veličina fonta (font size) 11, Italic, ravnanje teksta Justify, a tekst rezimea pisati bez proreda (Line Spacing Single), sa razmakom od 6 pt između pasusa, bez uvlačenja prvog reda.

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Key words: *navesti, maksimalno, pet, ključnih, reči.*

JEL: *Q16, M24* (www.aeaweb.org/jel/jel_class_system.php)

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2 Anđela Marković, Ph.D., Principal Research Fellow, Institute of Agricultural Economics, Volgina Street no. 15, 11060 Belgrade, Serbia, Phone: +381 11 444 444/int 112, E-mail: andjela.markovic@iep.bg.ac.rs

3 Petar Petrović, Ph.D., Full Professor, University of Belgrade, Faculty of Agriculture, Nemanjina Street no. 6, 11080 Zemun, Serbia, Phone: +381 11 222 222, E-mail: petar.petrovic@gmail.com

4 Mirko Mirković, M.A., Assistant, University in Belgrade, Faculty of Forestry, Kneza Viseslava Street no. 1, 11000 Belgrade, Serbia, Phone: +381 64 33 33 333, E-mail: mirko.mirkovic@yahoo.com

Introduction

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Tabele moraju biti formirane u tekstu rada, a ne preuzete u formi slika iz drugih materijala. Tabele unositi u sam tekst rada i numerisati ih prema redosledu njihovog pojavljivanja. Nazivi tabela moraju biti dati neposredno iznad tabele na koju se odnose. Koristite dole prikazani stil tokom njihovog formatiranja. Naslov tabela pisati sa razmakom 6 pt – iznad/before i 3pt – ispod/after, u fontu TNR, font size 11, ravnanje Justified. Tekst unutar tabela pisati fontom TNR, font size 9. Tekst u zaglavlju tabela boldirati. Izvor i potencijalne napomene pisati sa razmakom 3 pt ispod tabela (before). Izvore i napomene pisati u fontu TNR, font size 10,

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Table 5. The distribution cost of packaged goods from Subotica to retail-store objects

Indicators	Period			Total
	Month 1	Month 2	Month 3	
Distance crossed (km)	12.926	11.295	13.208	37.429
Fuel consumption (litre)	3.231	2.823	3.302	9.356
Value of fuel consumption (RSD)	242.378	211.790	247.653	701.821
Total time spend on touring (hour)	314	266	417	997
Value of total time spend on touring (RSD)	47.048	39.890	62.570	149.508
Number of tours	98	77	102	277
Toll value (RSD)	0	0	0	0
Number of pallets transported (piece)	1.179	976	1358	3.513
Total weight transported (kg)	602.600	429.225	711.116	1.742.941
Vehicle maintenance costs (RSD)	203.858	164.970	224.806	593.634
Lease costs (RSD)	480.938	454.214	565.784	1.500.936
Total sum (RSD)	974.222	870.864	1.100.813	2.945.899

Source: Petrović, 2012;
Note: Values within the table are calculated without Value Added Tax (VAT)

Grafike, dendrograme, dijagrame, šeme i slike treba unositi u sam tekst rada (ne koristiti opciju Float over text) i numerisati ih prema redosledu njihovog pojavljivanja. Njihovi nazivi se moraju pozicionirati neposredno iznad grafika, dendrograma, dijagrama, šeme ili slike na koju se odnose. Kod navođenja naslova, izvora i napomena koristiti isti stil koji je predhodno prikazan za formiranje tabela. Tokom pisanja rada u originalnom tekstu treba markirati pozive na određeni grafik, dendrogram, dijagram, šemu ili sliku (*Graph 2*.). Svi grafici, dendrogrami, dijagrami, šeme i slike u radu se svojom veličinom moraju uklapati u zadati format strane, te moraju biti centralno postavljeni. Fotografije nisu poželjne u predmetnom radu, a ukoliko se one ne mogu izbeći molimo Vas da koristite optimalnu rezoluciju (preniska rezolucija dovodi do pikselacije i krzavih ivica, dok previsoka samo povećava veličinu fajla bez doprinosa čitljivosti rada).

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