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CONTENT

THE RELATIONSHIP BETWEEN AUTOCHTHONOUS WINE ATTRIBUTES AND WINE CONSUMPTION MOTIVES

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ABSTRACT

This paper had a goal to explore the relationship between autochthonous wine attributes and wine consumption motives. Data were collected through a questionnaire, processed by standard statistical methods, univariate (general description of the sample), and multivariate statistics (factor analysis, cluster analysis and logistic regression). Through factor analysis five main dimensions of wine consumption motives were determined, namely social status, socializing effects, health, self indulgence and relaxation. For autohchthonous wine (Malvazija Istarska) three factor dimensions of wine attributes were determined: reccomendations, quality and origin. Through cluster analysis, wine consumption motives showed significant relations to the wine attributes, whereas self-expression, and health and taste stood out as the most important dimensions between high and low wine attribute importance segments.

Introduction

Wine is a high involvement product, so it can reflect the consumers' lifestyle, sense of identity and, due to different and wide range of attributes it can "fit" to a person. Therefore, wine consumers tend to pay special attention to different wine attributes in terms of origin (Kallas *et. al.* 2012)(local, autochthonous versus imported wines), grape variety, chemical and sensory features (as a consequence of freshness or aged, matured wines), packaging, pricing etc.

Our research was carried out in Istria where tourists that visit Istria, and local consumers mostly consume regional autochthonous wines, such as Malvasia istarska (white), and Teran (Refošk in Slovenia), Borgonja and Hrvatica (red) (Ružić et al., 2006). Hence, the main focus was placed on Malvazija istarska as the most commonly produced wine in

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Istria (Ilak Peršurić and Težak, 2011) and most frequently presented wine in restaurants in Istria (Težak *et al.,* 2009). Malvazija istarska is a geographically recognized, controlled and protected wine cultivar specific for Istria as a region. It is a grape variety grown predominantly in Istria (but also in some parts of Kras/Carso, Vipava valley and Brda/Colio). Malvasia istarska is also a wine brand well known in Croatia and Slovenia and among tourists visiting Istria, so it is a main focus of wine tourism in Istria.

As a way of promoting Malvazija istarska, different wine exhibitions and fairs are organized throughout the year in Istria because they enhance the perception of the wine region, the wine producers and their wines and overall the whole tourism destination (Ilak Peršurić et al, 2016). Wine events can be seen as a great marketing tool for wine producers and a way to attain a contact with consumers. As a producers' driven event it can be attractive to both, tourists and local-regional consumers. The consumers can get to know wine producers, taste wines and create an image about the wines. Wine events (fairs, festivals, exhibitions) are especially important for smaller wine producers with smaller quantities of wines, especially autochthonous wines, and less marketing funds and skills.

Due to the importance that wine exhibitions have in promotion of autochthonous wines, this research focuses on wine exhibition visitors. Research regarding wine attributes and wine motives is ussually concentrated on wine in general terms (Verdonk et al., 2016, Chrysodou and Jorgensen, 2016, Schultz, 2015, Cardebat and Fiquet, 2013, Jarvis et al., 2007). Our research was built upon research of Brunner and Siegrist (2011), Bruwer et al. (2002), Duarte et al. (2010), Kallas et al. (2012), MacDonald et al. (2013) and Hall et al. (2001) and Ramos et al. (2011) and explores the relationships between autochthonous wine attributes and wine consumption motives in the context of wine exhibition visitors.

Theoretic background

Consumers in Western societies usually purchase food and beverages through retailers e.g. retail chains and shops, while they are less likely to buy them directly from the producer on green markets or at the farm/cellar door.

In general terms wines have certain attributes, in literature described as extrinsic and intrinsic attributes, whereas extrinsic qualities are origin, grape variety, packaging, price, while intrinsic qualities have a value for reputation, expert opinions, tasting ratings, appellation, and sensory values.

Wine as high involvement product reflects the consumers lifestyle, sense of identity and with its wide range of offer wine as a sensory product can "fit" to a person.

Wine is a "single origin" product, with clear origin of a certain land, wine region, grape variety and therefore it can be clearly distinguished on the wine market from other products with the same name "wine".

Wines with regional features, especially wines from well-known wine regions with geographical identity, autochthonous wines and awarded wines have a better market

position compared to wines produced in less known wine countries and regions, so those wines are an excellent base for developing wine tourism and enhancing gastronomic experience. Consumers perceive the reputation of a wine region and labels as a direct assurance of the wine quality (Combris et al., 2009, Gomez et al., 2013, Koch et al., 2013, Marzo-Navarro et al., 2012, Melo et al., 2010). Wine consumption motives also have an important role in wine purchasing decisions and they are directly linked to wine attributes (Bruwer et al., 2002, Duarte et al., 2010, Fotopoulos et al., 2003). As showed by Lockshin et al. (2006) an average consumer facing unfamiliar wines and without previous knowledge about a wine on the shelf will choose in priority the wine from a well-known region or a wine which has received a certain award or medal.

Geographic origin of a wine presumes specific qualities of the wine that can be described by analytical (chemical, physical) and sensorial features. For certain grape varieties these qualities are well known and prescribed by independent accreditation organizations or authorities which organize wine testing, tastings and ratings ensuring that the wine satisfies the criteria of geographic origin and grape variety label.

Therefore the aspect of wine region and vine variety is very important and can lead a consumer toward understanding what is in the bottle influencing the purchase and consumption. Well-known brands (advertised or recommended) also positively influence on purchase, especially on low involvement consumers while highly involved consumers chose more often something new, even from less known wine land or region because they have more knowledge and are more aware and conscious about new wines on the market (Verdonk et al., 2016). For Danish consumers the origin of wine and grape variety were most important attributes (Chrysochou and Jorgensen, 2016). Danish consumers perceived origin labels as official assurance of quality and authenticity. Labels of world wine known regions or countries such as France, Italy, Spain as "old" wine countries and Australia, Chile as "new" wine countries with heavily marketed wines can easily provoke a consumer to purchase their wine (much more than a less known land of origin like Croatia). On the case of Australian and Spanish consumers the regional and wine region label were highly valued among consumers and affected their purchase decisions (Kallas et al, 2012, Verdonk et al. 2016). Australian consumers showed their loyalty to typical Australian red wines with European origin like Cabernet Sauvignon and Shiraz (Jarvis et al. 2007). These two types of wines were most common on the Australian market and were very well accepted. Their most appreciated attribute was price, followed by grape variety, region of production and brand. The age of wine and the process of wine ripening has also an effect on the consumer's behaviour in wine consumption and purchase. Beside the wine region label, the special labels such as eco labels can achieve higher, premium prices as shown in the case of Canada (Lopes et al. 2016).

The influence of extrinsic features of the wine bottle (etiquette, label, bottle size and shape) have certain effects on the perception of wine and affect on the intrinsic description of wines such as high end, prestigious, ancient, refined, elegant, noble, with tradition, rustic, trustworthy or at the other end as modern, basic, cheap, simple, clear, modest, empty (Celhay and Remaud, 2016).

According to wine types there is a general impression that consumers like more fresh white wines and consume less frequently sparkling or sweet wines (Melo et al., 2010). Also aged wines are accepted as wines with more value (Hughson et al., 2004, Chrea et al., 2011) especially red wines. Chinese consumers too, tend to favour red Australian wines (Liu and Murphy, 2007). They developed various ideas that the consumption of red wine is connected to certain "higher", "classier" life style. In the case of white wines, Australian consumers place high loyalty on fresh Chardonnay and Riesling (European origin grapes) which were most common white wines on the Australian market (Jarvis et al., 2003).

Classification of consumers in surveys holds to overall suggestions that price and grape variety have the strongest influence on consumers' choice and purchase, while packaging and labels were of less importance. Consumers tend to reflect the price to the level of quality and are willing to pay higher price for wines from well-known wine regions (Ampuero and Villa, 2006, Boudreaux and Palmer, 2007, Chrea et al., 2011). The importance of price per bottle is rooted in the intrinsic value of the consumer and therefore can achieve "hedonic" price (Frankel and Rose, 2010, Rössel and Beckert, 2012).

When purchasing a wine for the first time, the consumer often has no previous knowledge about the product or that knowledge is limited, so the consumer has to rely on different wine attributes. Wine is perceived as a product which has a certain value. This value is perceived before the product is consumed, which means that consumers decide on the purchase primarily through the extrinsic features such as geographic origin, grape variety, harvesting year. When the wine is purchased and consumed (benefits received) then the consumer can be motivated for purchase with intrinsic attributes which rely more to their emotional response and beliefs. Satisfaction (e.g. "good value for money") or dissatisfaction with the product stored in the consumers' memory can affect the future consumption or purchase (Foxall and Goldsmith, 1994). Wine attributes have been studied by various researchers in different contexts like quality (Combris et al., 2009, Gomez et al., 2013, Koch et al., 2013, Marzo-Navarro et al., 2012, Melo et al., 2010), perception of wine (Celhay and Remaud, 2016), loyalty (Jarvis et al., 2007), lifestyle (Bruwer et al., 2002), relevance (Eldesonky and Mesias, 2014), wine quality (through dimensions of extrinsic values such as origin, vintage and ageing ability and intrinsic attributes, like flavour, bouquet, image, Jouvier et al. (2004).

Generally speaking, wine attributes enable producers to position their wines on the market, and help consumers in making wine purchasing decisions. Matos Graça Ramos et al. (2011) found that consumers perceive wine attributes as intrinsic and extrinsic and that those attributes are either tangible or intangible. Thus, extrinsic and intrinsic attributes of wine as a product are usually a starting point for researcher interested in examining wine attributes.

Wine attributes were examined by a number of authors, whereas extrinsic attributes were origin, grape variety, packaging, price, while intrinsic attributes were value for reputation, expert opinions, tasting ratings, appellation, and sensory values (Chrysochou and Jorgensen, 2016, Eldesonky and Mesias, 2014, Matos Graça Ramos et al., 2011).

In the context of visibility Eldesonky and Mesias (2014) determined that package is the main attribute to achieve it, the shape, colour, size, letters, pictures, information (weight, calories, expiration date, content, product description) on the bottle are as relevant as the price, quality, brand, origin of the wine.

Consumers tend to link the price to the quality level of the wine and are willing to pay higher price for wines from well-known wine regions (Ampuero and Villa, 2006, Boudreaux and Palmer, 2007, Chrea et al., 2011). Those regions usually develop well-known brands (advertised or recommended) that have positive influence on purchase, especially in the case of low involvement consumers (Verdonk et al., 2016) or consumer that have no knowledge about the wine (Lockshin et al., 2006).

The age of wine and the process of wine ripening have also an effect on the consumer's behaviour in wine consumption and purchase. According to wine types there is a general impression that consumers like more fresh white wines and consume less frequently sparkling or sweet wines (Melo et al., 2010). Also aged wines are accepted as wines with more value (Hughson et al., 2004, Chrea et al., 2011) especially if they are red wines. In the case Australian consumers high loyalty levels were evident to Chardonnay and Riesling (European origin grapes) which were most common on the market (Jarvis et al., 2007).

The influence of extrinsic features of the wine bottle (etiquette, label, bottle size and shape) have certain effects on the perception of wine and effect the intrinsic description of wines such as high end, prestigious, ancient, refined, elegant, noble, with tradition, rustic, trustworthy or at the other end as modern, basic, cheap, simple, clear, modest, empty (Celhay and Remaud, 2016). Reputation of a wine region for consumers directly assures quality of the wine (Combris et al., 2009, Gomez et al., 2013, Koch et al., 2013; Marzo-Navarro et al., 2012, Melo et al., 2010). Another social influence on consumers occurs though recognition and positive recommendations from experts, such as sommeliers and catering facilities personnel. When „wine experts" review certain wine attributes positively and publish the findings of wine reviews in report or articles, those reviews have positive effects on wine procurement (Hertzberg and Malorgio, 2008, Roma et al., 2013). Wines with positively rated sensory attributes can achieve „hedonic„ price of wine (Benfrattelo et al., 2009, Cardebat and Fiquet, 2009, 2013, Outreville, 2011). The opinions of experts and retailers are welcome as they enhance the purchase (Cardebat and Fiquet, 2013). In the case of retailers, the educated and knowledgeable personnel who can give recommendations about wines are highly valued by consumers and enhance the sales (Goodman et al., 2010).

While wine attributes influence consumer's choices, wine consumption motivations as inner drives cause people to take actions to satisfy their needs (Hughson et al, 2004). When considering reasons why consumers drink wine, various, often different motives emerge (Brunner and Siegrist, 2011, Charters, 2006, Duarte et al., 2010, Fotopoulos et al., 2003, Hall et al., 1997). Based on previous research regarding wine consumption motives, Charters (2006) divided wine consumption motives into three main groups, namely

physical or utilitarian reasons (like refreshment and improvement of health), experiential in character or hedonic reasons (e.g. relaxation, socialization trying something new), and symbolic reasons (like social acceptance and celebration). These three groups summarise different research where different wine consumption motives were determined like motives linked to product features, social factors and psychological dimensions (Hall et al., 1997); motives related to food's attractiveness, good taste, quality, healthiness, information/control/ethical production, traditional image and distinctiveness (Fotopoulos et al., 2003), different motives related to lifestyle (Brunner and Siegrist, 2011) and other wine consumption motives and attitudes (Duarte et al., 2010).

Wine consumption motives influence wine purchasing and are important in relation to wine attributes (Brunner and Siegrist 2011, Bruwer et al. 2002, Duarte et al. 2010, Fotopoulos et al, 2003, Liu and Murphy 2007). The relationships between wine consumption motives and wine attributes were examined by Brunner and Siegrist (2011) with similar approach to Bruwer et al. (2002) and combined involvement, motives and attributes in order to detect consumer oriented segments for the Swiss wine market. Duarte et al. (2010) examined this relationship using a more direct approach i.e. they linked the segments of wine consumers based on the wine consumption motives with miscellaneous intrinsic and extrinsic wine attributes.

The relationship between wine consumption motives and wine attributes is usually examined indirectly (Brunner and Siegrist, 2011, Bruwer et al. 2002, Fotopoulos et al. 2003, Liu and Murphy, 2007). Bruwer et al. (2002) included wine consumption motivations through dimensions of wine-related lifestyle and they determined differences between consumers on the basis of wine style and price. Fotopoulos et al. (2003) examined this relationship by grouping motives into different groups of consequences and values (i.e. functional consequences, psychological consequences, instrumental values and terminal values) and then liking them though hierarchical value map with wine attributes (label, bottle, value for money, origin etc.).

Materials and methods

Research settings

Primary research was conducted as a part of project financed by Operational Programme Slovenia-Croatia 2007-2013, "MalvasiaTourIstra" thus it included both the Croatian and Slovenian part of Istria. Every year from March through November many wine fairs and exhibitions in Istria take place, mainly in order to stimulate and promote wine as a part of gastronomy offer and Istria as a wine region. The main focus of this research was placed on two wine exhibitions (wine exhibition Vinistra in Poreč, Croatia and wine exhibition Festival Malvazija in Portorož, Slovenia). Both wine exhibitions place high importance on wine Malvazija istarska, which is autochthonous to the region. The wine exibition Vinistra is organized each May by the Wine and Viticulture Association - Vinistra, Town of Poreč and Istria County, while Festival Malvazija is organized by the Association of Wine Growers in Slovenian Istra and by the Town of Portorož. Both

exhibitions comprise also various accompanying evens, like food and wine pairing, cooking shows, presentations of wines and producers, presentation of wine accessories (glasses and bottles special for Malvazija tasting and bottling), professional speakers with presentations about Malvazija (production, marketing, wine tourism etc.). Both wine fairs and organizers are active on their national and international level to promote Malvazija istarska as a brand, a geographically recognized, controlled, protected wine cultivar specific for Istria as a region. Vinistra organizes contests and ratings for the best Malvasias ("The world of Malvazija" whereas all producers from all over the world can apply with Malvazija, because beside Malvazija Istarska which is grown only in Istria, there exist about five hundred varieties of Malvazija grown in other European and overseas countries). Similarly in Slovenia a contest for the best Malvazija is organized.

All these activities have influenced positively on the image of Malvazija istarska as a wine and on Istria as a wine region, and finally enhanced the picture of Istria as a tourism destination.

In order to analyze the behavior of wine exhibition visitors, their motives for wine consumption, preferences to wine attributes and the correlation of these two research subjects, we have chosen a sample of visitors which attended two wine fairs.

Our intention was to collect as much data as we could (this was the first scientific research of this type in both countries) about the consumer behavior considering one autochthonous wine (and grape) variety, Malvazija istarska.

Since in literature the vast research is forwarded to wine in general terms, in our research we had used a relatively rare approach to study one recognized, geographically protected and autochthonous variety. Somehow we have followed the research of other authors (Verdonk et al., 2016, Chrysodou and Jorgensen, 2016, Schultz, 2015, Cardebat and Fiquet, 2013, Jarvis et al., 2007) and tried to examine if regional/local attributes are rated and appreciated by consumers (similar to the case of Spain, Kallas et. al. 2012., whereas the regional attribute of "Catalan" was rated higher that the attribute "Spain" in general population, and pointed stronger by high involvement wine consumers).

The purpose of this paper was to explore the relationship between autochthonous wine attributes and wine consumption motives in the context of wine exhibition visitors. The goals of this paper were threefold: 1) to determine dimensions of wine consumption motives and wine attributes in the context of wine exhibition visitors; 2) to classify wine exhibition visitors based on the wine attributes related to autochthonous wine Malvazija Istarska; and 3) to determine relationship between wine attributes and wine consumption motives.

Sampling

The research study was conducted in Croatia in May 2014. while in Slovenia in March 2015. The target population included visitors of two wine exhibitions (Festival Malvazija and Vinistra) who were 18 years of age or older. They visited only the first or

the second wine exhibition. Visitors were approached by trained researchers and asked to participate in the survey. Researchers explained the purpose of the survey and said that the survey was anonymous. In the process of on-site data collection researchers were stationary while responders were mobile (Veal, 2006) and a convenient sample was used. The self-complete questionnaires were administered by researchers and 244 validated questionnaires were collected (the requirements for performing exploratory factor analysis were satisfied - a minimum number of 150 according to Field, 2005, Hair et al., 2014, Hinkin et al., 1997).

Measurement

For the purpose of this study, wine consumption motives and wine attributes were defined as multidimensional constructs. Wine consumption motives were adopted from Brunner and Siegrist (2011), Duarte et al. (2010), MacDonald et al. (2013) and Hall et al. (2001). In all, 33 items were originally used for measuring dimensions of wine consumption motives. Wine attributes were adopted from Duarte et al. (2010), MacDonald et al. (2013), Corduas et al. (2013), Quester and Smart (1996), Hall et al. (2001) and Ramos et al. (2011).

Our first hypothesis was that wine consumption (of Malvazia Istarska) would be motivated by social and socializing motives. The second hypothesis presumed that wine (of Malvazia Istarska) will be perceived as a healthy product and mean of relaxation. In our third hypothesis we presumed that attributes of origin and quality will be ranked as highest (for Malvazia Istarska wine). Our final hypothesis comprised the first three and presumed that wine attributes and consumption motives are connected with a statistically strong connection.

A total of 14 items were used for measuring wine attributes of Malvazija Istarska as an autochthonous wine to Istria region. Wine consumption motives and wine attributes were measured using a five-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree").

For the purpose of gathering data the questionnaire was constructed. It consisted of 23 questions which were divided into four sections: 1) preferences about wine consumption and purchase in general, 2) questions related to Malvazija Istarska as a autochthonous Istrian wine, 3) question focused on certain aspects of wine exhibition and 4) respondents' socio demographic characteristics (age, gender, education level, occupation, net monthly personal income and town/municipality). It was originally designed in Croatian and then translated into Slovenian by bilingual associate.

Statistical analysis

Data were processed using univariate and multivariate statistics. Univariate statistics were used for general description of the sample while multivariate statistics were used for determining dimensions of wine consumption motives and wine attributes, segmentation based on wine attributes and testing relationship among wine consumption motives and wine attributes.

To determine dimensions of wine consumption motives and wine attributes, exploratory factor analysis was done using maximum likelihood method and promax rotation with an eigenvalue of 1.00 or more to identify potential factors. Internal reliability for the scales was determined by computing Cronbach's alpha. Dimensions of lifestyle were calculated as a mean value for each respondent (DiStefano et al., 2009).

Cluster analysis was used for segmenting wine exhibition visitors based on the level of importance they place on different wine attributes for autochthonous wines. The number of clusters was determined by splitting the sample and using hierarchical clustering technique. Fifty observations from the sample were randomly selected for the hierarchical cluster analysis. The Ward method with squared Euclidean distance was employed to establish the preliminary number of clusters. To substantiate the number of clusters, non-hierarchical clustering technique (k-means) was used. Identified clusters were named using cluster centroids. Cluster validation using t-test for the purpose of criterion validity used six measures that were not included in the previous analyses (Hair et. al., 2014).

In order to determine the relationship between wine attributes and wine consumption motives, logistic regression was used. Dependent variable was two-cluster solution obtained through segmentation of importance of wine attributes for autochthonous wines of wine exhibition visitors. Independent variables were dimensions of wine consumption motivation.

Research results

Descriptive statistics

In total, questionnaires from 244 respondents were used in the analysis (45% Festival Malvazija and 55% Vinistra). The proportion of male respondents (58%) was slightly higher than that of females (42%). The majority of respondents were between 18 and 34 years of age (56%). The majority had obtained higher education (60%). According to employment, the respondents were self-employed (36%), 29% were employees, approximately 13% were students and 11% were retired. Visitors of Vinistra were in majority from Istria region (mostly from Poreč (12%), Pula (8%) and Portorož (6%) and 2% of foreign visitors, while visitors of "Festival Malvazija" were too in majority from Istria region with a slightly higher percentage of visitors outside the region Istria (10% from either Maribor or Ljubljana). Over 50% of the respondents came to wine exhibitions with their friends and two-thirds have already attended one of the wine exhibitions. Visitors usually visit either one (39%) or two (25%) wine exhibitions annually. In general terms they usually drink Malvazija Istarska a few times a month (38%).

Exploratory factor analysis

To identify dimensions of wine consumption motives, exploratory factor analysis was done on 33 items representing dimensions of wine consumption motives. The item means (Table 1) varied from 2.59 ("To establish status") to 4.31 ("To complete gastronomic experience"). In general, the items measuring dimensions of wine consumption motives were mostly

important to responders. Items with loading below .04 and cross-loadings were deleted, resulting in retention of 29 items. Using eigenvalues greater than 1.0 as criteria, five factors representing wine consumption motives formed clear factor structures (Table 2). Jointly, they accounted for 64.04% of accumulated variance, and most of the factor loading were greater than .60. They were labelled self-expression, connection, health and taste, indulgence, and relaxation. Cronbach's alpha coefficients were between .853 and .942.

Social status and prestige was comprised of different items related to respect, sophistication, status, distinctiveness, etc. Items measuring this dimension were unimportant to respondents or the least important which is in accordance to the findings of Hall et al. (1997). Connection encompassed various items regarding interactions with others through linking food, wine and special events. *Health and taste* included health-related aspects, taste and aroma. Both groups of wine consumption motives were highly important to respondents. *Self-indulgence* was composed of items referring to positive feelings, time for oneself, learning new things, etc. *Relaxation* was focused on relaxation and mood improvement. These two dimensions were of middle importance to respondents. These findings are partially in accordance with the finding by Hall et al. (1997) and Fotopoulos et al. (2003). The structure of five dimensions is very similar to the proposal by Duarte et al. (2010); self-expression being a part of the symbolic reasons group, health and taste the utilitarian reasons, and indulgence and relaxation the hedonic reasons. The only difference is evident in the dimension labelled connection because the dimension contained items from two groups, namely hedonic and symbolic reasons. Our factors were similar to the findings of Charters and Ali Knight (2002) which found motives to taste wine in socializing and self-indulgence effects (on a sample of wine tourists in wine cellars).

Our factor analysis showed five factors of motives toward wine consumption of Malvazija Istarska highly saturating the matrix. The first factor *Social status and prestige* had eight variables all highly saturating the matrix (six were above 0.8). Our respondents were motivated to consume wine as a product which requires respect for the person who consumes it (0.889), respect from other and reflects a picture of a person that is sophisticated (0.871), mature (0.853) and successful in business (0.840). Wine consumption clearly defines a person from "the others" reflecting a certain distinctiveness (0.815) and status (0.825). Wine is considered a modern drink (0.693) and knowledge about wine can be used to impress others (0.670).

The second factor *Socializing effects* related to motivation of enjoying personal connections and social occasions explaining sharing special moments in life with a bottle of wine (0.937) and connecting family (0.786) in used in socializing occasions (0.762). Since such socializing occasions occur with certain food it completes the gastronomy experience (0.740) and the taste of food (0.514).

The third factor was named "Health motives and taste" whereas motives were related to positive health aspects (0.840) and part of general healthy life style (0.819) and natural features (0.743). Taste and smell (0.436) and pleasure in wine (0.429) were also important motives.

Table 1. Results of exploratory factor analysis for motives of Malvazija Istarska wine consumption

Variables	1	2	3	4	5	Mean	SD
Social status and prestige							
To be respected	.889					2.63	1.463
It marks a sophisticated person	.871					2.94	1.454
Drinking wine testifies to a mature personality	.853					3.03	1.462
Display of success in business environment	.840					2.86	1.350
To establish status	.829					2.59	1.438
To be distinctive	.815					2.61	1.518
It is “in”	.693					2.60	1.539
To impress other people with knowledge about wine	.670					3.13	1.447
Socializing effects							
Connection during special moment in life		.937				4.08	1.052
Connects family across generations		.786				3.70	1.220
Socializing with friends and family		.762				4.09	1.054
To complete gastronomic experience		.740				4.31	0.950
To enhance the taste of food		.514				4.25	0.972
Health motives and taste							
Good health-related aspects			.840			3.82	1.069
It is a part of healthy lifestyle			.819			3.50	1.195
It is a natural drink			.743			4.03	1.083
I love the taste and smell			.436			4.21	1.027
Drinking for pleasure			.429			4.18	1.049
Self indulgence							
To feel good				.863		3.88	1.166
Time for me				.853		3.73	1.260
To relax after a busy workday				.729		3.61	1.283
Trying something new				.545		3.74	1.307
Relaxation							
To relax					.854	3.91	1.170
To have a break in dynamic environment					.786	3.73	1.262
It improves my mood					.717	3.90	1.173
Eigenvalues	9.395	3.283	1.5468	1.346	1.000		
% cumulative variance	37.981	51.512	58.099	62.100	65.042		

Variables	1	2	3	4	5	Mean	SD
Cronbach's α	.942	.868	.853	.866	.881		
Mean	2.80	4.08	3.95	3.74	3.85		
SD	1.230	0.853	0.861	1.060	1.081		

Source: Data processed by authors

The fourth factor *Self indulgence* was named for motives which create pleasure for oneself, to well-being, feeling good (0.863), free time for thy self (0.853), relaxing after work (0.729) enjoy free time, creating a break in a hectic life (0.786).

The last, fifth factor *Relaxation* showed the need for relax in general terms and using a glass of wine to relax (0.854), dividing the day of work or other obligations and taking a break (0.786) for thyself and a mean to enhance your mood (0.717).

To identify dimensions of Malvazija Istarska wine attributes, exploratory factor analysis was done on 14 items representing dimensions of wine attributes (Table 2).

Table 2. Results of exploratory factor analysis for Malvazija Istarska wine attributes

Variables	1	2	3	Mean	SD
Recommendations					
Recommendations of the salesperson	.929			3.23	1.207
Recommendations of the waiters	.798			3.36	1.104
The design of the bottle and the label	.591			3.44	1.117
Recommendations of friends	.503			3.81	0.986
Quality					
Ageing of wine		.978		3.61	1.086
Vintage		.782		3.68	1.133
Quality (PDO. PGI labels)		.578		4.00	1.033
Amount of sugar		.529		3.64	1.047
Origin					
Terroir / locality			.945	3.52	1.202
Micro region / wine region			.913	3.50	1.224
Producer/brand			.544	3.59	1.204
Eigenvalues	3.760	1.585	1.111		
% cumulative variance	34.180	48.586	58.685		
Cronbach's α	.803	.807	.840		
Mean	3.46	3.73	3.54		
SD	.877	.856	1.052		

Source: Data processed by authors

The item means varied from 3.23 (Recommendations of the salesperson) to 4.00 (Quality). All items measuring dimensions of wine attributes were important to responders to a certain degree, which is partially in accordance to the findings

of Eldosonky and Mesias (2014) who have found that the label on the bottles is as important as quality, brand and origin. Items with loading below .04 and cross-loadings were deleted, resulting in retention of 11 items. Using eigenvalues greater than 1.0 as criteria, three factors representing wine attributes formed clear factor structures (Table 2). Jointly, they accounted for 58.69% of accumulated variance, and most of the factor loading were greater than .60. They were labelled presentation, quality and origin. Cronbach's alpha coefficients were between .803 and .840.

Dimensions of wine attributes were calculated as a mean value for each respondent. The mean scores of the dimensions were around 3.50 with quality being the most important wine attribute. The dimensions were cluster analysed. Using the hierarchical clustering technique, two cluster solutions were selected based on the largest and most plausible proportionate change. A non-hierarchical cluster analysis procedure was utilized to finalize the cluster solutions using the a priori number of clusters determined through hierarchical technique. The latter procedure confirmed a two-cluster solution.

The results of factor analysis of motives for Malvazija Istarska wine attributes showed that we gained three factors which highly saturated the matrix. *Recommendations* were comprised of different aspects related to presentation of wine like recommendation, and design of the bottle and the label. In our sample these attributes scored lowest mean values, but the items were the least important to responders, similar to Cardebat and Fiquet (2013). Within the first factor *Recommendations* we had recommendations of the sales persons (in our case the producers at the wine fair) with the highest factor loading (0.927). Similar importance of sales staff in retail was shown by Goodman et al. in 2010. Recommendations from waiters had second importance (in restaurants or hotels) whereas respondents value very highly their opinion and influence on their choices (0.798) likewise in the case of French consumers (Cardebat and Fiquet, 2013). Since the majority of respondents came to wine fair with friend, they have valued their recommendation of wines with a high score (0.503) in the first factor. Here there exists a socialising effect connected to wine as showed by Yuan and Jang (2008).

Quality included items regarding the wine properties, e.g., vintage and markers of quality. Responders found items measuring product quality of the highest importance which is partially supported by Hughson et al. (2004), Jouvier et al. (2004) and Chrea et al. (2011). *Origin* was composed of items referring to location of vineyards and branding. Item measuring had medium importance to responders was in accordance with the findings Comris et al, 2009 and Verdonk (2016). The reputation of Malvazija Istarska and Istria as a wine region was clearly recognized and validated by our respondents similar to findings of African, Spanish, and Australian respondents (Verdonk et al. 2016, Kallas et al. 2012, Lopes et al. 2016).

In the second factor *Quality* were explained; intrinsic attributes of wine ageing and vintage had high factor loadings (0.978 and 0.782). The age of wine and its ageing process were very important to respondents because aged wines were perceived with higher value similar to findings of Hugson et al. 2004.

Quality labels had somewhat lower loadings (0.578) since Malvazija Istarska is already an established wine with warranty of origin, production techniques and sensory qualities. Since Croatian and Slovenian consumers prefer dry and fresh wines the sugar content was of least important wine attribute in factor two (0.529).

The third and last factor comprised *Origin*, specific aspects of Istria as a wine region with localities (terroirs) with specific soil, climate and natural features and various producers/brands. Factor loadings showed high scores for terroir (0.945) and micro region (0.913) showing that Croatian and Slovenian consumers recognize Istria as a wine region and highly respect and recognize certain micro locations (in the Croatian part of Istria three sub regions exist). Certain localities (terroirs') were graded higher than others because they had higher value for viticulture production (because of micro climate, soil, sun insolation or exposition to sun) resulting in wines with specific recognizable sensorial features. The name of producer of the brand was the last variable in the factor matrix with loading 0.544 showing that respondents have specific taste and prefer certain producers' more than others. Therefore the family name, the story about the family, vineyards, wine and production can positively influence on the perception of the consumer and provoke them in a positive way to consume and buy Malvazija Istarska from a certain producer and certain terroir.

Cluster analysis

Cluster 1 represented 35.4% of respondents, while Cluster 2 included 64.6% of respondents. Although the two clusters differed statistically based on all three composite measures (Table 3), origin stood out. The first cluster was labelled low importance, while the second cluster was labelled high importance. The former cluster expressed unimportance of origin compared with the latter cluster.

Table 3. Results of cluster analysis

Composite variables	Final Cluster Centers		F value	Sig.
	1	2		
Recommendations	3.00	3.71	35.061	.000
Quality	3.20	4.03	52.788	.000
Origin	2.43	4.14	297.724	.000

Source: Data processed by authors

The second cluster in general placed high importance on three dimensions of wine attributes for autochthonous wines. Thus, origin proved to be the main differentiating aspect confirming the finding of Duarte et al. (2010) and partially confirming the findings of Chrysochou and Jorgensen (2016).

Four measures that were not included in previous analysis were used to validate clusters (Sinclair-Maragh et al. 2015). They were: awards, price, discounts and reviews. These wine attributes are usually perceived as very important attributes (Hertzberg and

Malorgio, 2008, Roma et al. 2013) and are usually linked to each other and to other wine attributes (Benfrattelo et al., 2009, Cardebat and Fiquet, 2009, 2013, Outreville, 2011) so they were used for validation of the clusters. All four variables were significant verifying statistical differences between the cluster, thus providing support for criterion validity of the items that measured wine attributes (Table 4).

Table 4. T-test results for cluster validation

Variables	Cluster 1 Low importance 35.38%		Cluster 2 High importance 64.62%		T-test	Sig.
	M	SD	M	SD		
Awards	3.24	1.209	3.98	0.980	-4.393	.000
Price	3.33	1.121	3.75	1.043	-2.577	.011
Discounts	2.78	1.327	3.32	1.250	-2.795	.006
Reviews	2.30	1.115	3.22	1.186	-6.237	.000

Source: Data processed by authors

Logistic regression

Two predictors were significant in predicting the odds of belonging to a high importance group (Table 5). The model explained between 22 and 30% of variance. Wine consumption motives that were significant in predicting high importance group were self-expression, and health and taste.

Table 5. Results of logistic regression

Variables	B	SE	Z values
Self-expression	.685***	.171	4.010
Connection	-.144	.254	-0.566
Health and taste	.738**	.270	2.732
Indulgence	.351	.227	1.546
Relaxation	-.364	.230	-1.578
Constant	-3.388**	1.042	

Source: Data processed by authors

Note: Cox & Snell R Square = 0.216, Nagelkerke R Square = 0.296, *** α significant at 0.001, ** α significant at 0.01, * α significant at 0.05

Both motives increased the odds of being in a high importance group suggesting that those two motives are more important to responders who place higher importance on wine attributes when buying autochthonous wine.

Discussion and conclusion

This paper explored the relationship between autochthonous wine attributes and wine consumption motives in the context of wine exhibition visitors. Through the analysis, a few main implications emerged.

Our research was based on a rare approach to study consumers and their behaviour towards an geographically protected and autochthonous wine grape and wine Malvazija Istarska. Our goal was to find what drives consumers to this particular wine similar to research of Boudreaux and Palmer on Cabernet (2007) and Cardebat and Fiquet on Beaujolas and Bordeaux wines (2009, 2013).

Through our research we have confirmed our first hypothesis that consumption of wine will be motivated by social and socializing motives. The structure of wine consumption motives in our sample was very similar to the proposal by Duarte et al. (2010) and Hall et al. (1997). Motives were found in expression of social status (respect, sophistication, success, distinctiveness) similar to findings of Brunner et al (2011) and Charters (2006), Fotopoulus et al (2003), Liu and Murphy (2007). Socializing effects (connection of wine with special moments, family, friends, gastronomy) were in accordance with the findings by Hall et al. (1997) whereas wine has proven as bound and connection in socializing with family and friends.

In our second hypothesis we presumed that consumers perceive Malvazija Istarska wine as a product good for their health and a mean of relaxation. We found that healthiness of the Malvazija istarska wine and its taste were generally important as wine consumption motives. Indulgence and relaxation as the purely hedonic reasons were also important consumption motives, and these findings were partially in accordance with the findings by Hall et al. (1997), Hall et al. (2001) and Fotopoulos et al. (2003).

Considering the importance of wine attributes for Malvasia Istarska as an autochthonous wine, wine exhibition visitors recognised all wine attributes as important to a certain degree, which is partially in accordance with the findings of Eldosonky and Mesias (2014). Still, a socializing effect was shown whereas friends affect wine choices of respondents more strongly than recommendations from professionals. The aspects of quality concerned age, vintage, geographic origin labels and sugar content of Malvazija Istarska, and all attributes were graded highly by respondents (similar to findings of Hertzberg and Malorgio, 2008, Matos Graca Ramos et al 2011). Origin had medium importance, suggesting that respondents were already familiar with the wine and therefore less under the influence of wine professionals opinions while more confident on their own opinions or friends recommendations. Malvazija Istarska was already positioned in their minds as an autochthonous wine of Istria as a region. Surveyed consumers were very confident and aware of certain micro locations and were in favour of micro locations (terroir).

Through cluster analysis two clusters were differentiated upon three composite measures. Considering wine attributes for autochthonous wines, as segmentation criteria, origin played the most important role. Origin distinguished segments of wine consumers, suggesting that wine exhibitions focused on promoting autochthonous wines accomplished their goals.

The relationship between wine consumption motives and wine attributes by linking segments of wine consumers and their wine consumption motives with miscellaneous

intrinsic and extrinsic wine attributes was surveyed by numerous authors (Brunner and Siegrist 2011, Bruwer et al. 2002, Fotopoulos et al. 2003, Liu and Murphy, 2007). Our survey confirmed their findings (through logistic regression) and adds an additional contribution because this relationship was tested in the context of autochthonous wine Malvazija Istarska.

Our third hypothesis was confirmed since all findings considered, wine consumption motives were connected to wine attributes. Generally speaking, utilitarian (health and taste) and hedonic reasons (self-expression) were generally major wine consumption motives, while purely symbolic reason like self-indulgence may be perceived as somewhat less important or motives important in certain occasions.

Finally our research results about wine attributes (origin, quality) could be used in marketing and advertising Malvazija istarska to consumers and tourists which visit Istria (similar to Charters and Ali Knight, 2002). Promotion of Istria as a wine region could be based upon our results on the motivation toward the wine region attributes with its micro locations and terroirs (similar to Hall and Mitchell, 2002). Identified motives of social aspects and healthiness of Malvazija Istarska wine Istria could be be used in promotion of Istria as a hedonic and wellness destination.

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Conflict of interests

The authors declare no conflict of interest.

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IMPACT OF DIFFERENT LIGHT INTENSITY ON THE PRODUCTION OF THE PLANT NARCISSUS L. AND ITS FINANCIAL EFFECTS

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A B S T R A C T

Plant production monitoring should be conducted taking into consideration agrarian, economic and other factors. The authors of the paper point out the importance of the intensity of light on plant growing in predominantly urban growing conditions. The authors conducted an experimental research on Narcissus L. The focus was on 8 physical parameters of cultivated plants that are compared to average actual prices on the market of the Republic of Serbia. The contribution of authors is in pointing out an individual physical plant parameter with a decisive impact on its price. Narcissus L. growing under lower natural light intensity indicates that the biggest impact on plant price is that of the flower diameter (β = .555, $\pi \leq .001$). Plant growing under higher light intensity has an impact on its price predominantly on the basis of the flower diameter (β=2.947, $p \leq .001$) and stalk diameter (β = 2.947, $\pi \leq .001$).

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Introduction

Numerous authors refer to blooming of *Narcissus* L. as a sign of arrival of spring (Kandeler and Ullrich 2009; Tooke and Battey 2010; Boanca et al. 2014). Grown in urban conditions, it is exposed to natural light of different intensity (Popović et al. 2014).

The genus *Narcissus* L. includes approximately 50 species (Simón-Porcar 2015) growing in vast habitats (Arroyo and Barrett 2000). Increase in daily temperatures triggers growth processes in *Narcissus* L., (Rudnicki and Nowak 1976; Hobson and Davies 1977; Horton and Ruban 2005).

The study conducted supplements the research on the impact of light on the plant (*Narcissus* L.), (Chen 1969; Briggs and Christie 2002; Sun et al. 2005; Devlin et al. 2007; Folta and Maruhnich 2007; Loreto et al. 2009; Albert et al. 2009). A visible result of growing plant *Narcissus* L. is its flower, although there are other measurable properties (Rønsted et al. 2008).

The principal aim of this paper is to present the impact of light of different intensity on the plant (*Narcissus* L.) growing. The other aim of the authors is to compare the effects of 8 chosen parameters of the plants under observation on their market price. The parameters chosen by the authors are those corresponding to visual requirements of customers.

The authors tested morphological plant properties by selecting 8 parameters (flower diameter, stem length, stem diameter, leaf length, leaf width, above-ground plant mass, bulb diameter and bulb mass). More productive plants have higher price, which is in line with the paper published by the authors (Popović et al. 2017a), stating the importance of real valuation. The expectations of the authors were that plants grown in area exposed to higher intensity light (2000 lx) would be more competitive than those grown under lower intensity light (1000 lx) in open-air urban areas.

The authors' principal expectations were that in both cases of plant growing, out of the 8 selected parameters, the size of flower would be prevailing in determining the marketability of the plants grown. The authors expected that, out of the selected parameters measured, a big effect would be of those that could be visually evaluated by customers. When plants grown in the shade were concerned, the expectations were that plants would be less competitive, with smaller flowers and lower values of the 7 tested parameters.

The experiment was conducted in the open, on two land plots, with the distance of 30-50 m between them, continuously exposed to different light intensity. Measurements showed that light intensity differed 100%, as the first plot was in the shade of park trees and urban furniture. *Narcissus* L. bulbs, 12/14 cm in circumference, were planted in soil of the following properties: pH in KCl = 6.98 in H_2O = 7.46, $CaCO_3$ in percentage terms was 3, while humus in percentage terms was 3.86. 100 bulbs were planted in each plot, plus 20% reserve bulbs in two parallel rows, in 15 cm deep holes, with 7.5 cm distance between two bulbs, and the distance between two rows of bulbs of 10 cm.

The results are analyzed by applying the arithmetic mean method with standard deviation, using the one-way variance analysis (ANOVA) and regression analysis. The results of the first regression analysis show that for plants grown in the shade (1000 lx), out of 8 selected parameters, the biggest effect is that of flower diameter (β=.555, $p \leq .001$), whereas a lesser contribution is that of stem diameter (β=.274, $p \leq .001$) and length (β=.250, $p \leq .05$). The results of the second regression analysis show that for plants grown under higher light intensity (2000 lx) the biggest effect is that of stem diameter (β=2.947, $p \leq .001$) and flower diameter (β=-2.664, $p \leq .001$), and the smallest is of bulb mass (β=.286, $p \leq .01$).

On the basis of the above stated, we developed three hypotheses **H1-3. H: 1** Plant (*Narcissus* L.) growing under conditions of different natural light intensity results in plants of different output values. **H: 2** growing the plant (*Narcissus* L.) under conditions of different natural light intensity and comparison to average retail prices show significant differences. **H: 3** Plants (*Narcissus* L.) grown under conditions of higher light intensity have greater values of the tested parameters and therefore a higher price.

Finally, we focused our activities on determining an individual contribution of each of the 8 selected parameters of plants grown under different light intensity, as by a different organization of plant production it is possible to improve parameter values in the future.

Material and methods

The experiment was conducted in the City of Novi Sad area (latitude 45° 20', longitude 19° 51'), more precisely, approximately 1000 meters from the entrance to Novi Sad plant nursery (north of Serbia). The average annual air temperature at the site is 10.9° C, with average precipitation of approximately 578 mm and altitude of 86 m. The activities were carried out in the period from 1 November 2013 to 3 March 2016, when values of the 8 chosen parameters were measured.

The experiment commenced by planting bulbs of 6-7 cm in diameter in the soil from which weed was mechanically removed and which was not fertilized or chemically treated since 1963. The two plots were close to each other (approx. 35 m distance), and they were continuously exposed to different sunlight intensity during the day. The first plot received 100% less sunlight (due to trees and urban furniture of up to 0.5 m height) than the second. That was confirmed by measurements of light intensity in the part of day with the most intensive sunlight on both plots. Measurements of light intensity were made by a manual device along both plots on every 0.5 to 0.8 m, and the device tolerance was 3%.

Light intensity measurements were made at 12, 14 and 16 hours on 30 March 2014, 30 March 2015 and 30 March 2016. Control measurements were made 30 days before and 30 days after the period under consideration in the same time intervals. At each measurement the natural light intensity on the first plot was 1000 lx, and on the second 2000 lx.

The first aim of the study was to determine the impact of different natural light intensity on cultivated plants on the basis of their morphological changes, by monitoring 8 physical values of the selected parameters. The second aim was to disclose the significance of changes in 8 selected parameters in terms of retail prices in the Republic of Serbia on the three selected days in the three years under observation (2014-2016). The third aim was to determine which of the 8 selected parameters had the biggest impact on retail price.

Data obtained in the experiment were processed using the arithmetic mean analysis. The authors also used the variance analysis (ANOVA) to compare the groups. In addition to that, two regression analyses were made to test the relationships.

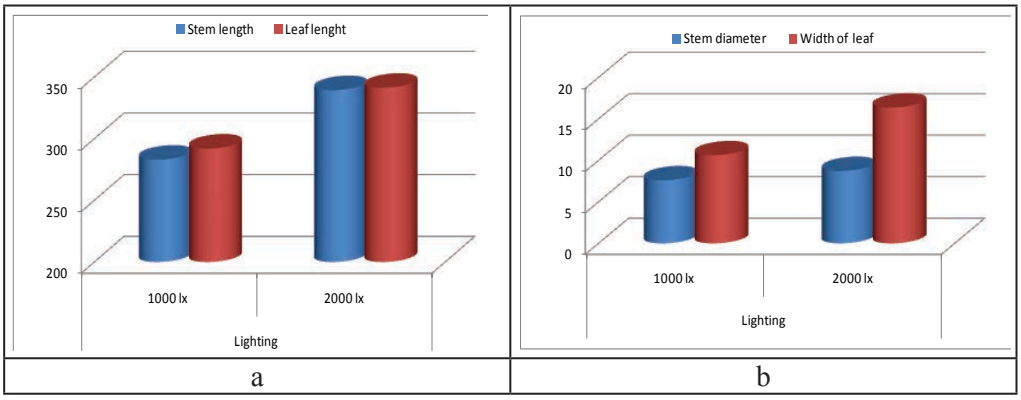
Results

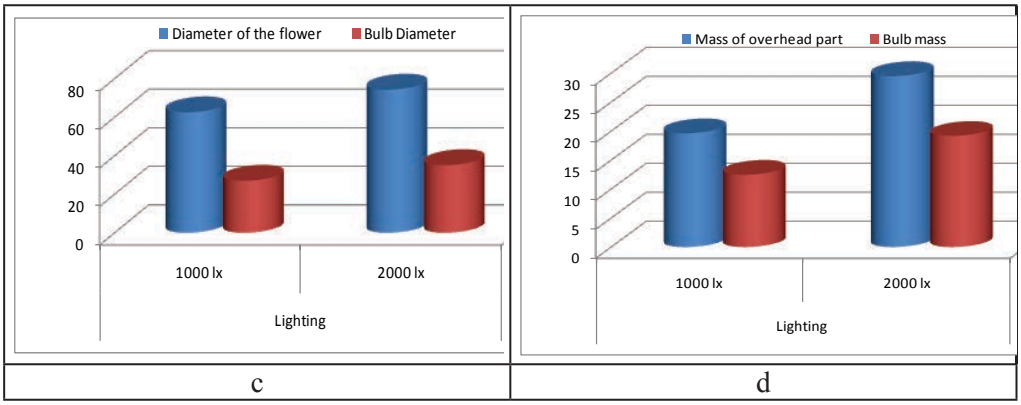
Impact of light on morphological properties of plants

Following the published three-year experiment (from 1 November 2013 until 30 March 2016) conducted in an open-air urban area under conditions of significantly different natural light intensity; the obtained results on the grown plants indicate significant changes in plant appearance.

The results of the described physical measurements of the selected parameters of the grown plants are presented using the arithmetic mean of the 8 plant parameters in question as follows:

Figure 1. Average values of stem length and leaf length (mm)





c d

Note: (a), stem diameter and leaf width, mm, (b), diameter of the flower and bulb diameter, mm, (c), mass of overhead part and bulb mass, g, (d), grown under different intensities of light intensity

Source: author's own research.

Further research conducted by the authors on the impact of light on plant morphological properties (Table 1) is shown through 8 parameters of the arithmetic mean and standard deviation. The results of arithmetic means have greater values, i.e. plants have greater physically measured values in all 8 parameters in conditions of being grown under higher intensity light (2000 lx compared to 1000 lx in the shade). We applied the one-way analysis of variance to compare the arithmetic means of the parameters. Value p = .000 is obtained with all 8 parameters, indicating significant differences in the plants grown. The biggest value, F = 530.174 is obtained for flower diameter parameter and F = 519.877 for stalk length parameter which indicates that these two parameters are the most pronounced of all parameters involved.

Table 1. Results obtained by comparing physical values of parameters (ANOVA)

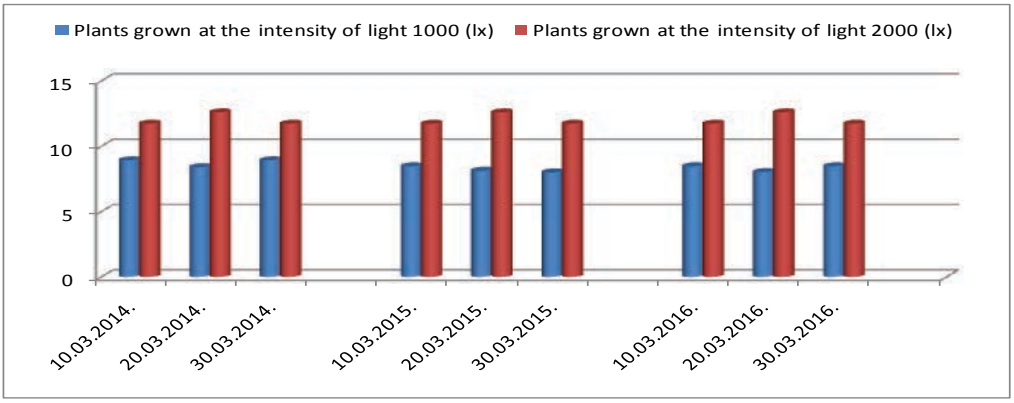
Parameters	Arithmetic mean		Standard deviation		F	p
	Light intensity					
	1000 lx	2000 lx	1000 lx	2000 lx		
Flower diameter	62.50	74.30	4.24	7.80	530.174	.000
Stalk length	282.93	339.33	20.41	37.67	519.877	.000
Stalk diameter	7.60	8.73	.89	1.65	109.659	.000
Leaf length	291.93	341.27	35.32	55.47	168.809	.000
Leaf width	10.62	16.37	2.20	5.71	264.238	.000
Plant above-soil part mass	19.63	29.49	8.26	9.35	187.238	.000
Bulb diameter	26.98	35.10	3.80	7.30	292.023	.000
Bulb mass	12.47	19.17	2.71	5.21	389.786	.000

Source: author's own research.

Plant pricing

The impact of the selected parameters of plants grown under different light intensity on their pricing in the tree days of measurement in March in the 2014-2016 interval, is shown in Fig. 2

Figure 2. Average prices realized on the retail market for plants grown at different light intensity.



Source: author's own research.

Results of relations of prices and plants grown are presented in Table 2. The obtained plant parameter measurement results are p = .000. Throughout the research period the results of the one-way analysis of variance (ANOVA) indicate that prices of plants grown in shade are lower.

Table 2. Results obtained by comparing prices and parameters (ANOVA)

Prices at day/year	Arithmetic mean		Standard deviation		F	p
	Light intensity					
	1000 lx	2000 lx	1000 lx	2000 lx		
10 March 2014	8.93	11.73	.99	1.69	607.645	.000
20 March 2014	8.40	12.60	1.50	2.54	607.645	.000
30 March 2014	8.93	11.73	.99	1.69	607.645	.000
10 March 2015	8.47	11.73	.99	1.46	1.025.570	.000
20 March 2015	8.13	12.60	1.50	2.11	891.835	.000
30 March 2015	8.00	11.73	.99	1.95	869.012	.000
10 March 2016	8.47	11.73	.99	1.46	1.025.570	.000
20 march 2016	8.03	12.60	1.49	2.58	702.809	.000
30 March 2016	8.47	11.73	.99	1.46	1.025.570	.000

Source: author's own research.

First regression analysis

We went further in our research to determine which of the 8 selected parameters of plants grown in the shade (1000 lx) prevails individually in retail price setting (Tab.3 and Tab.4).

Table 3. First regression analysis of relations between the average retail price and physical values of the selected parameters of plants grown under light intensity of 1000 lx

	Sum of squares	Degree of freedom	Average square	F	Significance level	R	R^2	Adjusted R^2
Regression	497.708	8	61.46	34.549	.000	.698	.487	.473

Source: author's own research.

Table 4. Values of selected parameters as predictors of average retail price of plants grown at light intensity of 1000 lx

Predictors	Non-standardized ratios		Standardized ratios	t	Significance level
	B	Standard error	Beta		
Constant	-2.398	.889		-2.698	.007
Stalk length	.012	.005	.250	2.241	.026
Flower diameter	.131	.018	.555	7.338	.000
Stalk diameter	.305	.091	.274	3.365	.001
Leaf length	-.008	.005	-.234	-1.719	.087
Leaf width	-.093	.061	-.112	-1.543	.124
Above-ground part mass	-.013	.017	-.059	-.773	.440
Bulb diameter	.029	.023	.115	1.246	.214
Bulb mass	-.031	.038	-.087	-.812	.417

Source: author's own research.

The first regression analysis of the plant grown at 1000 lx indicates the biggest effect of flower diameter on the flower retail price (β=.555, $p \leq .001$), whereas somewhat lesser effect is that of stalk diameter (β=.274, $p \leq .001$) and length (β=.250, $p \leq .05$).

Second regression analysis

The research continued in order to determine which of the 8 selected parameters of the plant grown under 2000 lx light intensity has the biggest individual effect on retail price setting (Tab. 5 and Tab. 6).

Table 5. Second regression analysis on relationship between the average retail price and selected parameters of plants grown at 2000 lx light intensity

	Square sum	Degrees of freedom	Average square	F	Significance level	R	R^2	Adjusted R^2
Regression	245.944	8	30.743	55.713	.000	.778	.605	.594

Source: author's own research.

Table 6. Values of the selected parameters as predictors of the average retail price of plants grown under 2000 lx light intensity

Predictors	Non-standardized ratios		Standardized ratios	t	Significance level
	B	Standard error	Beta		
Constant	-7.905	2.072		-3.815	.000
Stalk length	.047	.005	.825	10.404	.000
Flower diameter	-.727	.140	-2.644	-5.192	.000
Stalk diameter	3.846	.580	2.947	6.635	.000
Leaf length	.023	.006	.703	3.714	.000
Leaf width	-.331	.061	-1.620	-5.383	.000
Above-ground part mass	.242	.031	1.943	7.875	.000
Bulb diameter	.351	.046	1.144	7.642	.000
Bulb mass	.123	.045	.286	2.727	.007

Source: author's own research.

The second regression analysis of the plants grown under 2000 lx indicates that the biggest effect is that of stalk diameter (β=2.947, $p \leq .001$) and flower diameter (β=-2.664, $p \leq .001$), followed by the above-ground part (β=1.943, $p \leq .001$), leaf width (β=-1.620, $p \leq .001$) and bulb diameter (β=1.144, $p \leq .001$). Somewhat smaller is the effect of stalk length (β=.825, $p \leq .001$) and leaf length (β=.703, $p \leq .001$) and the smallest effect is that of bulb mass (β=.286, $p \leq .01$).

Discussion

Our initial expectations were that there was a significant impact of light intensity on morphological features of plants grown under different natural light intensity, and we were focused on two analyses relating to the plant growing.

First, physical values of plant parameters obtained on the basis of experiment results were analyzed. The results indicate that there is a significant difference among all 8 physical parameters (p = .000) measured on the plants grown under different natural light intensity, which corresponds to the views of Kinoshita and Wada 2000; Kinoshita et al. 2001; Okazawa and Nishijima 2017; Tan et al. 2017. Plant growing under higher intensity light results in higher values of the 8 plant parameters, with the biggest difference in flower diameter (F = 530.174) compared to the plants grown in the shade.

The second observation relates to the price of plants grown under different light intensity. The obtained values of 8 parameters (p = .000) compared to their retail prices indicate a significant difference. Plants grown in the shade have lower retail prices. The prices were steady in the entire period in which the experiment was conducted, as illustrated in Fig. 2.

The complex observation of plant growing under different natural light intensity is made using two regression analyses, one for the plants grown at light intensity of 1000 lx, and the other for plants grown at light intensity of 2000 lx. We went further in our research by determining individual effects of the 8 physical parameters of the plants grown under different light intensity on retail price setting (Tab. 3 through 6). Plants grown under 1000 lx, i.e. in the shade, have lower price, with the biggest effect of flower diameter (β=.555, p≤.001), whereas stalk diameter (β=.274, p≤.001) and length (β=.250, p≤.05) have a smaller effect. Other physical properties measured through the selected parameters do not prove to be good predictors in retail price setting. Plants grown under 100% higher natural light intensity, which is 2000 lx, have higher prices, with the biggest effect of stalk diameter (β=2.947, p≤.001) and flower diameter (β=-2.664, p≤.001) on the flower price, followed by above-ground plant part (β=1.943, p≤.001), leaf width (β=-1.620, p≤.001) and bulb diameter (β=1.144, p≤.001), then, to a somewhat lesser extent, stalk length (β=.825, p≤.001) and leaf length (β=.703, p≤.001) and bulb mass (β=.286, p≤.01) having the smallest effect.

We point out that, on the basis of obtained results, H: 1 is fully accepted, as the plants grown under different light intensity have different product-related values. H:2 is fully accepted as the results of the experiment of plant growing under different natural light intensity are obtained and the comparison of light intensity to average retail prices resulted in significant deviations. H: 3 proved to be correct, as the plants (*Narcissuss* L.) grown under conditions of higher intensity light have significantly bigger values of the tested parameters and therefore a higher retail price.

Our final activities were aimed at determining an individual effect of each of the 8 parameters of selected plants grown under different light intensity, as it is possible to improve parameter results in the future with different organization of plant growing. This corresponds to the other research (Williams 2010; Popović, 2014; Popović et al. 2017b). The results of the study could serve for future research activities with other plants attractive in appearance, on the basis of the survey of customer needs, the demand for which is continuously growing.

Conclusion

There is an impact of conditions of urban plant production on their actual market price. The research results show that plants grown under different natural light intensity are priced differently on the market. Plants grown under higher natural light intensity have higher retail prices. The study indicates that in case of Narcissus L. grown under lower natural light intensity, out of 8 parameters under consideration, the biggest impact on its

price is that of flower diameter. Plant growing under higher light intensity has an impact on its price predominantly on the basis of flower diameter and stalk diameter. These conclusions can be used as a guideline to researchers in selecting the required plant properties that impact its price. The authors point out the innovation and importance of results they obtained in the study. They also emphasize that the research could be expanded to other plant species.

Conflict of interests

The authors declare no conflict of interest.

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DEMOGRAPHIC CHARACTERISTICS OF CONSUMERS IN CONSUMPTION OF ORGANIC FOOD PRODUCTS – CASE STUDY: SERBIA

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JEL*:* J1, J19, E21, M3, Q1

A B S T R A C T

The purpose of the paper is to determine the differences between demographic characteristics of consumers in relation to discouraging and motivating factors of consuming organic food products in Serbia. An empirical research was conducted in Serbia on a sample of 833 respondents, using e-questionnaire. T-test for independent samples was used. The results indicate that in relation to discouraging factors for consumption of organic food products there are differences in the demographic characteristics of consumers, exception is age. Also, in relation to motivation factors, differences exist in majority of consumers' demographic characteristics, except the level of education and place of residence. Practical application of the results enables adequately managed consumption of organic food products which directly affects the reduction of ecological, social, health and economic problems. On the other side, the theoretical application of the results enables the creation of a consumers' profile for organic food products.

Introduction

As a response to the deterioration of food quality and endangering of human health and the environment, the organic food was developed. Organic food is defined as

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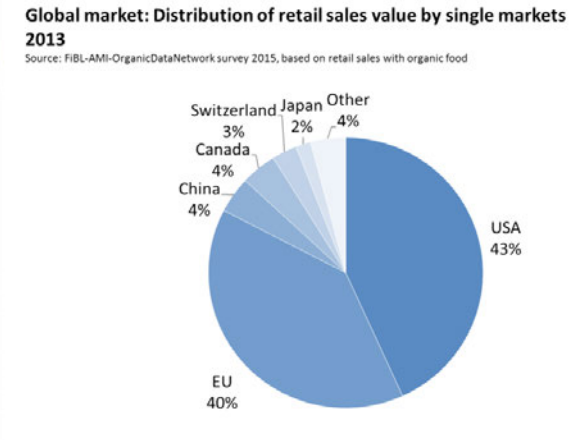
"food produced by farmers who emphasize the use of renewable resources and the conservation of soil and water to enhance environmental quality for future generations. Organic meat, poultry, eggs, and dairy products come from animals that are given no antibiotics or growth hormones. Organic food is produced without using most conventional pesticides; fertilizers made with synthetic ingredients or sewage sludge; bioengineering; or ionizing radiation." (https://www.nal.usda.gov)

Europe and Northern America absorb more than 90% of the world's offer for organic food (Willer, Lernoud, 2015, 25). These two regions are characterized by a continuous lack of required goods, considering that the production fails to reach the market demand. The biggest markets for organic food are USA, Germany and France (Figure 1) (Willer, Lernoud, 2015, 63). There are only few research done with regard to organic food consumption on the Balkan area. One of them was done by Sekovska and associates (2013) and they profiled organic food consumers and their preferences and attitudes regarding organic food.

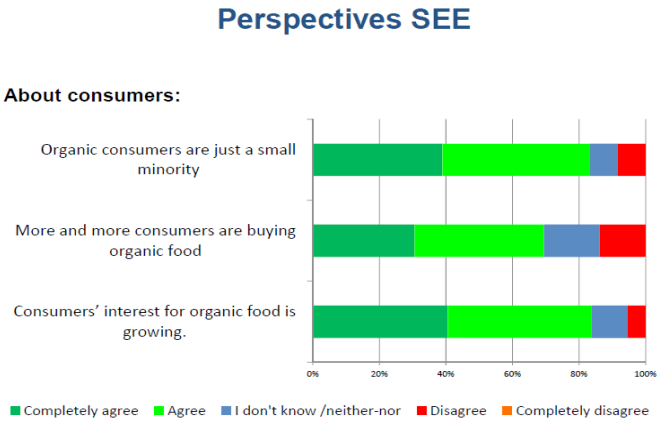
Figure 1. Global market: Distribution of retail sales value by single markets in 2013.



Source: Willer, Lernoud, 2015

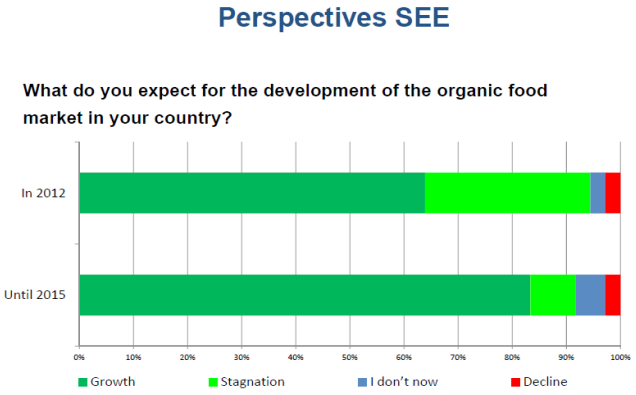
Organic food in Serbia is consumed for less than 0.01% out of all consumed products (Huynh, Maslac, 2009, 7). Organic food consumption per capita in Serbia in 2010 was 5,5 euros (Willer, Lernoud, 2013, 73). In Serbia, organic food consumption is at a unenviable position and the following data confirms that - 80% to 90% of organic food produced in the Republic of Serbia is exported (Dragin, 2009, 8). However, regardless of the low power consumption, increase consumption of organic food products in the Republic of Serbia is certain (Figure 3a and 3b).

Figure 3a. Tendency for organic food product consumption in the Republic of Serbia



Source: Jansen, Schaer, 2012

Figure 3b. Tendency for organic food product consumption in the Republic of Serbia



Source: Jansen, Schaer, 2012

Because of all mentioned above, it is necessary to efficiently manage factors that determine the use of organic food products in the Republic of Serbia. In order to make this achievable, it is necessary to know which factors are discouraging and which ones stimulate the use of organic food in the Republic of Serbia. As factors that discourage and motivate the demand for organic food products are affected by demographic characteristics of consumers (Kranjac et al., 2017; Vehapi, Dolićanin, 2016; Đokić et al., 2014), it is necessary *to determine differences between demographic characteristics of consumers in relation to discouraging and motivating factors of consuming organic food products in Serbia*, which is the aim of this paper.

Materials and methods

Various research were conducted on the topic of factors which determinate consumption of organic food (Żakowska, 2009; Sampson, 2009; Aertsens et al., 2009; Rakić, Rakić, 2009; Gfk, 2011; Suprapto, Wijaya, 2012; Dumea, 2012; Mohamed et al., 2013; Pagiaslis, Krontalis, 2014; Vehapi, Dolićanin, 2016a; Kovljenić et al., 2016; Türk , Erciş, 2017). The most common factors that stand out are: price, educational promotion, trust in product certificate, habits, supply and lack of knowledge of consumers about organic food consumption.

Demographical factors are one of the most popular criterias for consumers' segmentation. They significantly determine attitudes and behaviour of consumers. Different research has proved a positive correlation between consumers' demographic characteristics and consumption of organic food (Sampson, 2009; Aertsens et al., 2009; Paço, Mário, 2009; Huynh, Maslac, 2009; Grk, 2012; Pagiaslis, Krontalis, 2014; Đokić et al., 2014; Vehapi, Dolićanin, 2016b; Kranjac et al., 2017).

Based on the above, following hypotheses were proposed:

H1 - *There are statistically significant differences between demographic characteristics of consumers in relation to discouraging factors of organic food products consumption* and,

H2 - *There are statistically significant differences between demographic characteristics of consumers in relation to motivating factors of organic food products consumption.*

Sample

The sample consists of 833 respondents from the territory of the Republic of Serbia. The sample is considered representative considering: the size of the sample compared to the basic set, nature of research, the number of variables being researched, variability of population characteristics that is being questioned and desired level of certainty. While creating the sample, method of randomly selection was used. Analyzed demographic characteristics are: gender, age, level of education, monthly income and place of residence.

Amongst the total number of respondents, 58% were women and 42% were men. Related to the age, 32% of respondents were between the age of 18 and 30, 23% between 31 and 40 years old, 16% between 41 and 50 years old and 29% were older than 51. The majority of the respondents have college education (31%). The same percentage of respondents have completed high school and have university degree (23%). A smaller number of respondents have completed university – master degree had 15% of the respondents, followed by respondents who hold PhD (5%). Based on the monthly income, the sample was distributed to 46% of respondents with average earnings, 37% with earnings below average and 17% of respondents with earnings above average. The monthly income of the respondents was measured based on the average earnings in the Republic of Serbia published in the publication of the Statistical Office of the Republic

of Serbia (2016). The respondents had the possibility to declare if they had below, above or earnings similar to the republic average. Related to the place of residence, 78% of the respondents come from urban areas, while 22% come from suburbs.

Instrument

The instrument used in the research was a questionnaire, designed for the research purposes. The questionnaire was made based on the consulted literature, previous research and author's assumptions which are reformulated into questions. The questionnaire had two parts. The first part is related to the demographic characteristics of the respondents, which are presented in the research as independent variables. The second part deals with factors that determine organic food consumption i.e. factors that discourage and motivate organic food consumption in the Republic of Serbia. The answers were measured based on the Likert scale, 1 –I strongly disagree, 2 – I mostly disagree, 3 – neutral, 4- mostly agree, 5 – I completely agree.

Procedure

The survey was conducted on the territory of the Republic of Serbia. A team of ten researchers – previously trained graduated marketing students – undertook the survey during different days of the week (usually during afternoon and in the evening), over a period of two months (June-July, 2017). During the survey period, 1000 questionnaires were distributed, and 833 usable questionnaires were returned (usable response rate =83.3%).

Data analysis and variables

Data were analysed by means of software package SPSS: 20 (SPSS, 2008). The missing data were replaced by EM method, while analyses of deviated values indicate that there are none (Tabachnick, Fidell, 2007).

Independent variables in this study are the following: age, gender, level of education, monthly income and place of residence. There are also two dependent variables – discouraging and motivating factors of organic food products consumption.

Differences between groups were analysed by T-test for independent samples, with the following factors: age, gender, level of education, monthly income and place of residence. Dependent variables were discouraging and motivating factors.

Results

Table 1. presents descriptive analysis of applied scales. Based on the values of multivariate skewness and kurtosis, it can be concluded that the answers of respondents on the *"discouraging"* and *"motivating"* scale do not deviate significantly as compared to normal distribution.

Table 1. Descriptive scale indicators

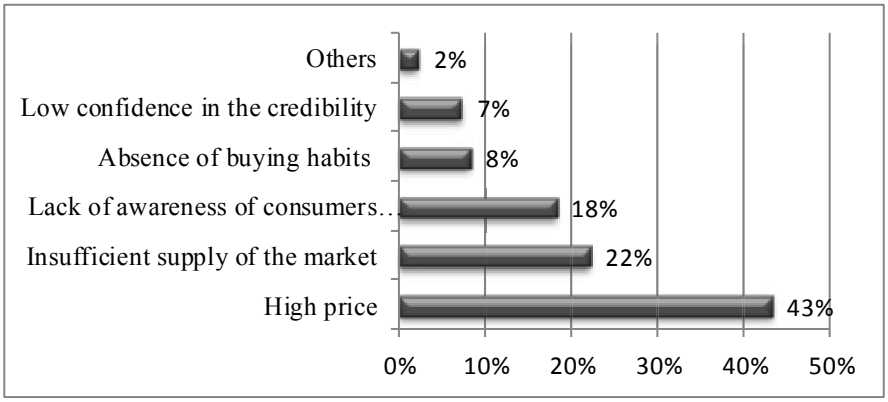
Scale	Min	Max	M	SD	Skew.	Kurt.	K-S	α
discouraging	19.00	50.00	39.99	5.09	-.625	1.066	0.492*	0.81
motivating	17.00	49.00	37.59	4.09	-.552	1.006	0.392*	0.80

*Note. *p < 0.1: Min. – minimal score; Max. – maximal score; M – arithmetic mean; SD – standard deviation; Skew. – Skewness; Kurt. – Kurtosis; K-S – Kolmogorov–Smirnov statistics; α – scale reliability measured by internal consistency*

Source: Authors based on data from survey research

Results obtained by descriptive statistics showed that discouraging factors of organic food consumption are: high price 43%; insufficient market supply 22%; consumer's lack of awareness of consumers 18%; absence of buying habits 8%, low confidence in the credibility of organic food 7% and others 2% (Figure 4).

Figure 4. Discouraging factors of organic food consumption in the Republic of Serbia



Source: authors

T-test for independent samples showed that differences in gender were set according to importance of discouraging factors of organic food consumption and significant differences were found in the factor of high price, $t(361)$)=-4.75, $p<0.01$ and consumer's lack of awareness about the advantages of organic food consumption, $t(361)$=-2.81, $p<0.01$ (Table 2). These two factors were more important to women than to men. A result like this showed that depending on gender, importance of discouraging factors of high price and consumer's lack of awareness about the advantages of organic food consumption were high.

Table 2. Gender differences in discouraging factors

Scale	t-test	df	Sig.
high price	-4.75	361	<.01
consumer's lack of awareness	-2.81	361	<.01

Source: authors

The analysis of one factor of a variant showed that there were no significant differences between the five categories of consumers' age and discouraging factors of organic food consumption. A result like this showed that the importance of discouraging factors was not present depending on consumers' age.

The analysis of one factor of a variant showed that there were significant differences between the four categories of education and all the above-identified discouraging factors of organic food consumption: high price, $F(3, 350)=3.90$, $p<0.01$, insufficient market supply, $F(3, 350)=4.68$, $p<0.01$, consumer's lack of awareness about the advantages of organic food consumption $F(3, 350)=4.95$, $p<0.01$, absence of buying habits $F(3, 350)=6.63$, $p<0.01$, and low confidence in the credibility of organic food, $F(3, 350)=4.41$, $p<0.01$ (Table 3). The importance of all discouraging factors rose in the same direction as the level of education of the respondents. This means that level of the respondents' education determines the extent to which listed factors discourage organic food consumption.

Table 3. Education differences in discouraging factors

Scale	F	df1	df2	Sig.
high price	3.90	3	350	<.01
insufficient market supply	4.68	3	350	<.01
consumer's lack of awareness	4.95	3	350	<.01
lack of habit for buying	6.63	3	350	<.01
low confidence in the credibility	4.41	3	350	<.01

Source: authors

Also, the analysis of one factor of a variant showed statistically significant differences between the three categories of monthly income of the respondents and a high price factor $F (3, 359)=11.69$, $p<0.01$ as well in regard to insufficient market supply with organic food $F (3, 359)=14.31$, $p<0.05$ (Table 4). The importance of a high price reduced, while importance of insufficient market supply with organic food increased with the increase of monthly income. This indicated that depending on respondent's monthly income, high price and insufficient market supply with organic food products had different level of importance as discouraging factor in consumption.

Table 4. Monthly income differences in discouraging factors

Scale	F	df1	df2	Sig.
high price	11.69	3	359	<.01
insufficient market supply	14.31	3	359	<.05

Source: authors

T-test for independent samples showed that differences due to the place of residence were important as a discouraging factor of organic food consumption. Significant differences were found with factor of high price of organic food consumption, t (363) = -4.45, $p<0.01$, and the absence of buying habits for organic food, t (363) = -2.87,

p<0.01 (Table 5). Such a result showed that depending on a place of residence there was difference from factor of high price of organic food consumption as well as the absence of buying habits organic food. These factors were more important for the suburban habitants.

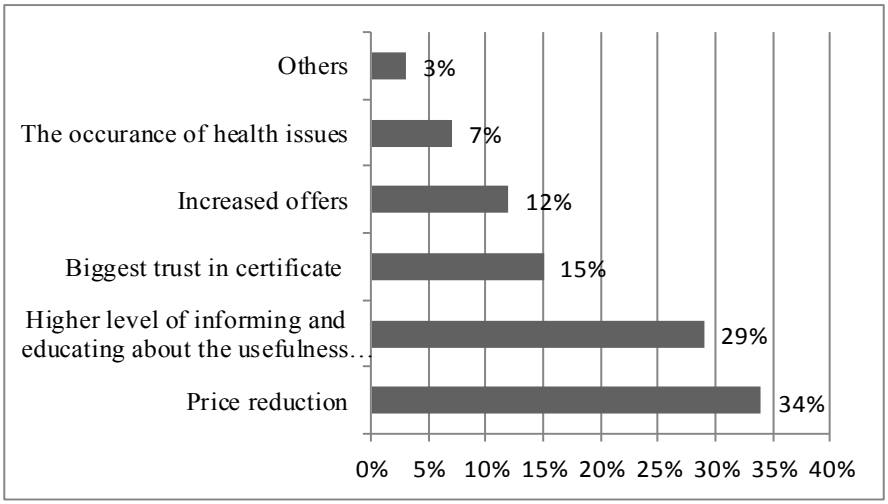
Table 5. Place of residence differences in discouraging factors

Scale	t-test	df	Sig.
high price	-4.45	363	<.01
absence of buying habits	-2.87	363	<.01

Source: authors

According to the results of a descriptive statistics, consumers would buy more organic products if: prices were lower 34%; they were more informed and educated about the usefulness and importance of organic food 29%; they had more trust in certificate signifying organic food products 15%; organic food offer were increased 12%; there were health issues that could be regulated by healthy nutrition 7% and others 3% (Figure 5).

Figure 5. Motivating factors of organic food consumption in the Republic of Serbia



Source: authors

T-test for independent samples showed that differences between the gender of respondents and established motivating factors were revealed, and it was determined that there were significant differences among factors of a higher level of informing and education about the usefulness and importance of organic food, $t(370)=-2.33$, $p<0.05$ (Table 6). Thereby, degree of motivating factors of a higher degree of awareness and education about the usefulness and importance of organic food was higher for women. This showed that depending on the gender of respondents there was difference within the importance of a motivating factor of a higher degree of awareness and education about the utilities and importance of organic food products.

Table 6. Gender differences in motivating factors

Scale	t-test	df	Sig.
higher level of informing and education	-2.33	370	<.05

Source: authors

The analysis of one factor of a variant showed that there were significant differences between the five categories of the age of respondents and a motivating factor of health issues, F (3, 335)=5.72, p<0.01, whereby degree of motivating this factor increased with the increase of the age of respondents. This result showed that depending on the age of respondents there was difference within the degree of motivating caused by this factor.

The analysis of one factor of a variant showed that there were no significant differences between the four categories of education of respondents and motivating factors of organic food consumption. Such a result showed that the importance of motivating factors did not change depending on education of respondents.

Likewise, the analysis of one factor of a variant showed that there were significant differences between the three categories of monthly income in assessment of motivating factors: higher informing and education about the usefulness and importance of organic food, F (4, 367) =5.86, p<0.01, biggest trust in certificate signifying organic food products F (4, 367) =11.48, p<0.01, and price reduction, F (4, 367) =3.22, p<0.05. Degree of motivating factors, higher informing and education about the usefulness and importance of organic food as well as trust in certificate signifying organic food products increased with the increase of monthly income, while the importance of factor of lowering price decreased. Such a result showed that degree to which respondents were motivating by three stated factors differs depending on monthly income of respondents.

Table 7. Monthly income differences in motivating factors

Scale	F	df1	df2	Sig.
higher level of informing and education	5.86	4	367	<.01
biggest trust in certificate	11.48	4	367	<.01
price reduction	3.22	4	367	<.05

Source: authors

According to the results gained from T-test for independent samples, differences between the place of residence of respondents and determined motivating factors were set, implying that there were no significant differences in factors that stimulate organic food consumption and place of residence.

Discussions

Results obtained by descriptive statistics showed that the most discouraging factor for organic food consumption is high price, then insufficient market supply and the consumer's lack of awareness, while the most motivating factor is lower prices, than greater information and education about the usefulness and importance of organic food

consumption and increase trust in certificate signifying organic food products. The results were confirmed by the previous research (Żakowska, 2009; Sampson, 2009; Aertsens et al., 2009; Rakić, Rakić, 2009; Gfk, 2011; Suprapto, Wijaya, 2012; Dumea, 2012; Mohamed et al., 2013; Pagiaslis, Krontalis, 2014; Vehapi, Dolićanin, 2016a; Kovljenić et al., 2016; Türk , Erciş, 2017).

The results indicate that there are differences in the demographic characteristic of consumers: gender, level of education, monthly income, place of residence, whereas there is no difference between age in relation to discouraging factors of organic food products consumption. The previous research (Sampson, 2009; Aertsens et al., 2009; Paço, Mário, 2009; Huynh, Maslac, 2009; Grk, 2012; Pagiaslis, Krontalis, 2014; Đokić et al., 2014; Vehapi, Dolićanin, 2016b; Kranjac et al., 2017) in great measure confirmed the obtained results. Respectively, previous research confirmed the obtained results in the part which referred to the established differences until it is not confirmed in the part referring to non-existence differences. Because all the above mentioned, *the hypothesis 1 has been partially confirmed*.

The results indicate that there are differences in the demographic characteristic of consumers: gender, age, monthly income, whereas there is no difference between level of education and place of residence in relation to motivating factors of organic products consumption. The previous research (Sampson, 2009; Aertsens et al., 2009; Paço, Mário, 2009; Huynh, Maslac, 2009; Grk, 2012; Pagiaslis, Krontalis, 2014; Đokić et al., 2014; Vehapi, Dolićanin, 2016b; Kranjac et al., 2017) confirmed the obtained results in the part which refers to the established differences until it is not confirmed in the part referring to non-existence differences. Based on the foregoing*, the hypothesis 2 has been partially confirmed.*

Conclusion

The results indicate that in relation to discouraging factors of organic food products consumption, there are differences in the demographic characteristic of consumers: gender, level of education, monthly income, place of residence, whereas there is no difference between age. Also, the results indicate that in relation to motivating factors of organic products consumption there are differences in the demographic characteristic of consumers: gender, age, monthly income, whereas there is no difference between level of education and place of residence.

Practical application of the results

The obtained data can be used to various market subjects (producers, traders, state institutions, international institutions, non-governmental organizations, etc.) in order to more effectively plan, implement and monitor marketing strategies and activities, all with the aim of increasing the consumption of organic food products. Further, the practical application of the results is reflected in the increase of sustainable consumption, which directly affects the reduction of ecological, social, health and economic problems.

Theoretical application of the results

Theoretical application of the results is reflected in the creation of a profile of consumers of organic food products which as such can be applied in other studies.

Limitations of the research

- Subjectivity in answering, since the taking about organic food products is socially responsible behavior;
- The survey was conducted through a single measurement, which also affects the relevance of the results.

Conducted research opens door for future studies:

- which will analyze other variables that influence the increase or decrease of consumption of organic food products;
- which will analyze other demographic characteristics of the variable in the dossier on other motive and demotivation factors;
- comparation with other countries, e.g Sekovska and associates (2013) compared consumers from Macedonia and Serbia;
- longitudinal character of research, for example, 10 years.

Conflict of interests

The authors declare no conflict of interest.

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ECONOMIC EFFICIENCY OF INVESTMENT IN GREENHOUSE VEGETABLE PRODUCTION WITHOUT HEATING

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JEL *Q10, Q12*

ABSTRACT

This paper analyzes the economic effectiveness of vegetable production in a protected area in terms and in a manner that is characteristic of the analyzed area (Bijeljina, Bosnia and Herzegovina). Dynamic methods for evaluating the economic feasibility of the investment were applied to two models of vegetables production in greenhouses. Models represent completely alternative investments, so the choice between them is based on the net present value. Economic justification under risk conditions was checked using the scenario analysis. The results of the survey indicate that the investments in both models are justified both in optimal and risky production conditions. The model that includes the production of two crops is economically more efficient than the production of one crop per year. The same model will take precedence also in risky production conditions, as indicated by the higher expected net present value and lower value of the coefficient of variation.

Introduction

Growing of vegetable products brings a number of benefits for both the agricultural producer and the community. Thus, in some countries of the world, vegetable production strongly affects the overall development of the economy, especially agriculture, but also food, chemical, pharmaceutical and other branches of industry, because for many countries exporting food, vegetables and processed vegetables, they represent very important products for acquiring foreign exchange income (Corovic et al., 2007). The data from the reports in the field of agriculture, food and rural development for Bosnia and Herzegovina (2016) show that vegetable lines with a share of 15% occupy a significant place in the total production of plants

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in Bosnia and Herzegovina. Revenues from vegetable production per unit of capacity are multiple times higher than the corn and wheat incomes, thus achieving better financial effects and more stable economic sustainability of agricultural producers (Hadelan et al., 2015). In the world, there has been an increase in the development of horticultural product production in a protected area that is relatively safe for human life, primarily due to increased demand for fruit and vegetables as a result of the growth of the world's population as well as an increase in living standards (Kuswardhani et al., 2014). For the growing trend of cultivation of these agricultural products in the protected area, the importance of vegetable consumption in human nutrition, as well as the fact that adverse climatic conditions often determine its production in the open field, is also meritorious. Vegetable production in protected areas is of great biological and economic importance. It enables the supply of vegetables in the autumn, winter and spring periods, during which the annual cycle of production and consumption of vegetables closes with production during the summer (Djurovka et al., 2002). Thus the protected area enables the agricultural producer to place fresh products on the market in the offseason period, when the offer of these products is reduced, which positively affects their demand as well as the price of them. All these factors make the production of vegetables in a protected area very attractive for the agricultural producer.

Protected production is considered to be an intensive production system that requires relatively high investment in several aspects of production and marketing (Engindeniz, Tuzel, 2006). Depending on the complexity of the facility itself, the amount of invested stakes will vary, the justification of which must be adequately analyzed. In order for the production of vegetables in greenhouses to have maximum effect of invested funds per unit, managers of farms must use appropriate methods, techniques and models for the assessment of economic efficiency in agriculture (Subic et al., 2007). By applying dynamic methods for evaluating investments it is possible to determine the justification of investment in production in a protected space taking into account the time value of money. These methods require the estimation of future business results and their reduction to the present value.

Also, production in a protected area binds itself to a number of risks that need to be analyzed before the realization of the investment itself. Risk management is one of the most significant problems in the analysis of investments, because when making investment decision, future events can not be foreseen (Gogic, 2010). In risky operating conditions there is an exception between realized and projected business results due to the effects of many factors that can affect them. Therefore, when analyzing the justification of investment, it is also necessary to evaluate the justification of production in risky conditions using the generally accepted methods for this purpose.

Materials and methods

In this paper several methods have been used which, in accordance with the aim of the research, enable a thorough analysis of the justification of these investments.

The aim of this paper was to determine the economic feasibility of vegetable production in greenhouses in optimal and risky conditions, and also in the different manner of exploitation of the protected area.

The aim also was to show the advantages of one of the two models used, based on the results obtained.

For the purpose of gathering information about the characteristics of the greenhouse production, primary sources of information for the analyzed area were used. The primary source is the results of the questionnaire covering vegetable producers in the protected area from the territory of Bijeljina. The survey was carried out in 2018. The companies that were the subject of research were selected by random sample method. The 37 family holdings were included into research. The sample includes farms in which the production of vegetables in greenhouses is the only or dominant source of income. By combining the questions of an open and closed type, trying to come all the available data were needed to continue the study. Data were collected on the structure of production, average yields, types of used greenhouses and similar. In order to determine the economic feasibility of the investment, investment models for greenhouse production have been created in various ways of using protected space. The model, as a simplified representation of the reality that is the subject of observation, sought to reflect the real situation in the analyzed area in terms of production technology and achieved production results. Production results on the present lines were determined using the calculation of net income (Direct Costing Method). The justification of investments in greenhouse production was analyzed taking into account the time value of money, and consequently, dynamic methods for evaluating investments were applied. Following dynamic methods were used: The net present value, the present value of net cash flow, internal rate of return and the payback period method.

The justification of investments in risky business conditions was analyzed using the scenario analysis method. The choice between investments that have complete alternatives was made depending on the net present value of the investment. The results are tabulated.

Results and Discussions

The area of the city of Bijeljina belongs to the regions with the largest production of vegetables in the Republic of Srpska (Bosnia and Herzegovina), both in the open air production and in the production in the greenhouses (Bodiroga, 2015). Based on the data obtained from the survey questionnaire, it has been established that there are several different design solutions in the surveyed area when it comes to protected areas. Glass greenhouses, as well as block types of greenhouses, were not present in the observed sample. The most common forms of protected areas are semi-high and high tunnels, while the rest are modern greenhouses without heating. Greenhouses with heating are solely used for the production of seedlings. One production line is realized on 89.25% of the area under greenhouses during the year. In this method of exploitation, tomatoes, cucumbers and the bell peppers are represented in greenhouses, and they are grown in greenhouses in the period from March to April until the first frosts occur (October-November). On the remaining 10.75% of the area, two production lines are realized during the year. In this case, different combinations of crops are present, for example: cucumber-the capia type pepper, cucumber-cucumber, tomato-cucumber, cucumber-green beans and the like.

Based on the data on realized net income, while taking into account the necessary assumptions, two models were created on the basis of which the analysis of economic feasibility of production under the given conditions was made:

- I Model - production of one line per year (cucumber);
- II Model - production of two lines per year (cucumber-green beans).

In the first model, production was selected in one line during the year, in order to determine the economic feasibility of the investment in conditions and in the way that production is most often taking place in the analyzed area. Cucumber production is planned during the entire exploitation period.

The second model determined the economic justification of the investment in a situation where two production lines are represented in the protected area. In this case, the cucumber has a shorter harvest period, less yields per unit area, and hence less revenues achieved. After the cucumber, green beans are grown, which also has similar defects in relation to the situation when it is grown as the only crop.

Both models used were created by taking into account the following assumptions:

- The family farm has 2000 m² of protected area;
- Production is carried out without heating;
- Irrigation is a drop-drop system;
- The plastic sheet is changed every four years;
- Financing of the investment is carried out partly by own and partly by credit funds. The discount rate is therefore created as a weighted average between the opportunity costs and the interest rate on credit resources of 4.05%;
- For agrotechnical operations, side-machine services are used, and paid work for them is included in net income calculations;
- Two working-age family members are engaged in production on the property;
- Gross salary for the work of family members is envisaged in the amount of 3700,00 € per year per member;
- Liquidation value of the investment object is determined on the basis of the depreciated value of the plastic sheet and the non-depreciated value of the construction which can be used approximately for 20 years;
- Earnings and issuances during the start-up and use of the investment arise at the end of the yea;
- With both models used, production is assumed in the same greenhouses and the same costs of raising the investment facility.

The costs of raising the investment facility consist of the costs of raising the greenhouse and the costs of installing the irrigation system. The models are supposed to use high tunnels. The costs of raising such an investment object are given in Table 1.

Table 1. Costs of raising the investment object (2000 m²)

Type of expenses	**Sum in €**
Pipes	6.043,21
Plastic sheet for the greenhouse	2.706,66
Making a hole for the greenhouse	1,350,00
Painting and transport of greenhouse	1,049,00
Installation of greenhouse	870,00
Other expenses	2.142,95
Total greenhouse	14.161,82
Irrigation system	425,65
Total	14.587,47

Source: Calculation of authors based on retail sales

The investment facility consists of five high tunnels of 400 m². It can be seen from the table that the costs of procurement of greenhouse pipelines have the largest share in the total costs of the investment facility. The costs of the irrigation system can vary significantly depending on the location of the greenhouse and the type of irrigation system. The displayed costs include an irrigation system consisting of an electric motor pump and other perennial installation elements (alkaline pipes, couplings, semiconductors, taps and the like). This irrigation system is referred to by manufacturers as a system that requires not only the smallest investments, but also the least cost during exploitation.

The economic feasibility of investing in production in a protected area was determined by applying dynamic methods for evaluating investments. All dynamic methods are based on the assumption of the time value of money, according to which money available today does not have the same value as the money that will be available in the future.

The application of these methods is based on the determination of a series of cash receipts from the investment and a series of monetary issues made for the acquisition and use of an investment facility (Andric, 1998).

The projection of cash flows for the first model that determines the economic effectiveness of an investment in a protected space in which one line is produced annually is given in Table 2.

Table 2. Projected net cash flow for model I

Years	**Total income (€)**	**Total variable costs (€)**	**Fees for the work of family members (€)**	**Cost of replacement foil (€)**	**Total expenditures (€)**	**Net cash flow (€)**
1	14.358,97	4.205,13	7.400,00	0,00	11.605,13	2.753,84
2	14.358,97	4.205,13	7.400,00	0,00	11.605,13	2.753,84
3	14.358,97	4.205,13	7.400,00	0,00	11.605,13	2.753,84

Years	Total income (€)	Total variable costs (€)	Fees for the work of family members (€)	Cost of replacement foil (€)	Total expenditures (€)	Net cash flow (€)
4	14.358,97	4.205,13	7.400,00	2.706,66	14.311,79	47,18
5	14.358,97	4.205,13	7.400,00	0,00	11.605,13	2.753,84
6	14.358,97	4.205,13	7.400,00	0,00	11.605,13	2.753,84
7	14.358,97	4.205,13	7.400,00	0,00	11.605,13	2.753,84
8	14.358,97	4.205,13	7.400,00	2.706,66	14.311,79	47,18
9	14.358,97	4.205,13	7.400,00	0,00	11.605,13	2.753,84
10	*21.439,88	4.205,13	7.400,00	0,00	11.605,13	9.834,75

* Liquidation value of the investment included
Source: Calculation by author based on survey data

From Table 2 it can be noted that the net cash flow is positive throughout the analyzed period. The total variable costs consist of the costs of seeds, fertilizers, pesticides, fuels, as well as other materials necessary for the realization of the production process. The sum of the variable costs that arise in the production of cucumber, the compensation for the work of family members and the cost of replacement of the plastic cover make total expenses during the exploitation of the investment. The plastic cover was changed in the 4th and 8th years and that was when the net cash flow had the lowest value. Total incomes are generated entirely by selling cucumbers. The estimated liquidation value, which amounts to 7,080.91 €, is included in the total incomes from the investment in the last observed year. The net present value, the present value of net cash flow, internal rate of return, as well as the payback period for the first model are given in Table 3.

Table 3. Value of indicators of economic efficiency of investment (model I)

Indicators	Values
Net present value (€)	8.174,46
Internal rate of return (%)	13%
Payback period (years)	8,19
Present value of net cash flow (€)	22.761,93

Source: Calculation by the author

The net present value of the investment shows the expected increase in investors' profits, which are created as a result of realization of a certain investment (Milić et all, 2005). The net present value of the investment has a value of 8,174.46 €, it is greater than the limit value of 0, which indicates that this is an investment that is economically justified. The same conclusion is obtained when the two other indicators used are also observed. Internal rate of return is the maximum interest rate that can be paid for the funds used in the project in order to recover the investment (Navyatha et all., 2015). The internal rate of return is higher than the minimum required rate of depreciation (4.05%), while the payback period is shorter than the planned exploitation period. The present value of net cash flow

gives an answer to the question of which is the largest amount of monetary assets that can be invested in an investment, and that it is economically acceptable under the given conditions and methods of financing (Milic et al., 2008). The upper limit of economic acceptability of investments in model I is € 22,761.93.

The cash flow for the planned exploitation period for the second model used is given in Table 4.

Table 4. Projected net cash flow for model II

Years	Total income (€)	Total variable costs (€)	Fees for the work of family members (€)	Cost of replacement foil (€)	Total expenditures (€)	Net cash flow (€)
1	15.743,59	4.923,08	7.400,00	0,00	12.323,08	3.420,51
2	15.743,59	4.923,08	7.400,00	0,00	12.323,08	3.420,51
3	15.743,59	4.923,08	7.400,00	0,00	12.323,08	3.420,51
4	15.743,59	4.923,08	7.400,00	2.706,66	15.029,74	713,85
5	15.743,59	4.923,08	7.400,00	0,00	12.323,08	3.420,51
6	15.743,59	4.923,08	7.400,00	0,00	12.323,08	3.420,51
7	15.743,59	4.923,08	7.400,00	0,00	12.323,08	3.420,51
8	15.743,59	4.923,08	7.400,00	2.706,66	15.029,74	713,85
9	15.743,59	4.923,08	7.400,00	0,00	12.323,08	3.420,51
10	*22.824,50	4.923,08	7.400,00	0,00	12.323,08	10.501,42

Source: Calculation by author based on survey dana

In this model, net cash flow is also positive throughout the entire exploitation period. The used economic performance indicators are given in Table 5.

Table 5. Value of indicators of economic efficiency of investment (model II)

Indicators	Values
Net present value (€)	13.568,32
Internal rate of return (%)	18%
Payback period (years)	5,63
Present value of net cash flow (€)	28.155,79

Source: Calculation by the author

All indicators used provide information that an investment in a protected area where two crops would be cultivated during the year is also economically justified.

Given that Model I and Model II represent investments with the same amount of invested stakes and the same exploitation period (i.e. investments that are complete alternatives), the choice between them is the best accomplished by comparing the net present value. An investment is economically more efficient than its alternative investment if its net present value at a given calculated interest rate is higher (Andric et al., 2005). The investment in model II has a higher net present value and it can be concluded that it is more economically efficient compared to the investment in model I.

The same conclusion can be achieved by comparing the internal rate of return that also has a higher value when investing in model II.

The use of dynamic methods imposes the need for a fairly accurate estimate of incomes and expenditures during the investment analysis period, which may be subject to increased uncertainty and error reporting during the predicting of the market situation (Szymszal et al., 2014). Decision making in terms of risk is a key component in the management of agriculture (Asci at al., 2014). Bearing in mind that agricultural production and consequently the production of greenhouses binds a number of risks that can lead to deviations between what is planned and achieved, often the economic justification of investments of this type is also checked under risk conditions by applying the generally accepted methods for this purpose. In analyzing the economic feasibility of the observed investments an scenario analysis was used in this paper. Scenario analysis includes key project risk factors (variables), its sensitivity to changes in key factors and the probability of changes (Brzakovic et all., 2016). It predicts three different scenarios (most likely, optimistic and pessimistic) when it comes to the value of key variables that affect economic effectiveness.
Three key factors (variables) whose changes in value are taken into account in the risk analysis are changes in the amount of invested stakes, changes in the level of expenditures for use of the investment, and changes in the amount of income during the exploitation period.

The most likely scenario is the assumption that the key variables will not change their values. This scenario will also have the highest probability of realization of 50%.

The optimistic scenario predicts the improvement of the observed variables and will be the assumed increase in income during the exploitation period of 5% in relation to the average achieved, while the assumption that the expenditures for the use of the investments as well as the amount of invested stakes is to be their decrease of 10% and 15%.

The pessimistic scenario predicts deterioration of the key variables taken into consideration. Thus, a reduction income of 10% is expected, and the increase in the expenditures for use as well as invested stakes of 15% and 20% respectively.

The analysis scenario calculates the expected net present value of the investment in greenhouse production for both modeled models, as well as the standard deviation and coefficient of variation for the same, which can be used as additional indicators when choosing between the observed investments. The data are given in Tables 6 and 7.

Table 6. Scenario analysis of production in protected area (Model I)

1. Type of scenario	Net present value (NPV)	Probability of realization (P)	NPV*P
- The most likely	8.174,46	0,50	4.087,23
- Pessimistic	-20.134,43	0,25	-5.033,61
- Optimistic	25.274,57	0,25	6.318,64
2. Expected net present value			5.372,26
3. Standard deviation σ			16.297,22
4. Coefficient of variation CV			3,03

Source: Calculation by the author

Table 7. Scenario analysis of production in protected area (model II)

1. Type of scenario	Net present value (NPV)	Probability of realization (P)	NPV*P
- The most likely	13.568,32	0,50	6.784,16
- Pessimistic	-16.732,11	0,25	-4.183,03
- Optimistic	31.809,44	0,25	7.952,36
2. Expected net present value			10.553,49
3. Standard deviation σ			17.424,82
4. Coefficient of variation CV			1,65

Source: Calculation by the author

Based on the data in the tables, it can be seen that both investments in risky operating conditions are economically justified because the expected net present value is positive in both cases. Taking into account all three indicators used, the investment is more economical in model 2, since it has a higher expected net present value and a smaller coefficient of variation compared to the first model observed.

Conclusions

Vegetable production in protected areas brings a number of advantages for the agricultural producer. However, this method of production demands and significant invested stakes whose justification is necessary to establish. Economic justification was carried out using dynamic methods for evaluating investments in two models showing the characteristic technology for the analyzed area. Individually, both investments are economically justified. Given that both investments have the same amount of invested stakes, the economically more attractive investment is in model II because it has a higher net present value. The results of the analysis scenario indicate that investments are economically justified in risky business conditions. The advantage of this criterion also has an investment in model II. This investment has the higher expected net present value, but also the lower value of the coefficient of variation. Based on the aforementioned, it can be concluded that the investment in high tunnels in which one crop is produced annually is economically justified. By cultivating two crops annually during the entire exploitation period, greater economic efficiency is achieved in both optimum and risky business conditions.

Conflict of interests

The authors declare no conflict of interest.

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ECONOMIC ASPECTS OF SHEEP FARMING ON THE FAMILY FARM MODELS IN THE HILLY-MOUNTAIN REGIONS OF SERBIA

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ABSTRACT

The hilly-mountain villages are important factor in food production and rural development of Serbia. The sheep production is in the fourth place of importance among branches of livestock production in Serbia, behind the cattle, pig and poultry productions. The aim of the paper is to analyze economic indicators of the sheep farming on family farms in Serbian hilly-mountain regions on the basis of 4 models which differ in intensity of crop and sheep production and to consider possibilities for improvement. The analysis has been done on the basis of data collected on 30 family farms. The economic indicators have been calculated on the basis of Direct costing calculation method and gross margins. The results have shown that production of lamb meat and sheep cheese represent the main source of the family farms' income in the hilly-mountain regions. The Model D with intensive crop and sheep production obtained the best economic results.

Introduction

Successful occupation with sheep production place farmers in front of certain financial and organizational requirements. Obtaining of successful economic results contributes to increased income and standard of living of family farms, and therefore their sustainability in the hilly-mountainous areas.

Sheep breeding is an important branch of agriculture, because it can be the best use of natural resources, especially in the hilly-mountain regions of Republic of Serbia. Thanks to the biological characteristics, sheep is adapted for growing in different climatic conditions. Sheep are primarily adapted for growing on pastures, where other types of domestic animals cannot be bred. Sheep breeding offers the possibility of obtaining three useful products: meat, milk and wool. Meat of sheep and lambs by the content of dry matter exceeds the pork and beef meat, and sheep milk has a higher percentage of fat, protein and dry matter than cow's milk. In Serbia the focus is on the production of lamb meat.

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Effective fattening of lambs, and thus the production of meat is conditioned by a lot of factors, of which particularly should be noted the characteristics of race, age, sex, the individual properties of sheep, the effect of castration, type of feed and the composition of meals. Profitability of lamb fattening depends on the value of the animals that enter the breeding, value of feed, feed costs, depreciation of buildings and equipment, production risk and other expenses (Pavličević et al., 2000).

Australian industry of lamb and sheep meat drawn up a strategic plan within which gave the top priority to research methods and principles for the delivery of lamb meat and carcasses that should be of adequate size with more muscle and less fat (Pethick DW et al., 2006).

Conditions for growing sheep are especially preferred in the hilly-mountain areas of Serbia, where there are about 1,700,000 ha natural pastures, which is a prerequisite for keeping a large number of sheep. That is why it is grown in this region more than 70% of total sheep heads in Serbia. However, breeding of sheep in these regions is usually in the form of extensive or semi-intensive manufacture (Mekić et al., 2006).

Sheep are expressive herbivores, which in the case of sole nutrition voluminous (bulky) feeding system, even if it is mediocre one, provide a very valuable products for human consumption (meat and milk), and in addition to that wool, leather and manure that is very convenient for plant production. Sheep are mostly grazing animals and they better use the grazing than the cattle (Pavličević, 2001).

Sheep production is mainly concentrated in the hilly-mountainous areas where there are more opportunities for grazing and those areas of Serbia have great potential for development of sheep production. Agricultural 2012 Census shows that sheep production is largely concentrated in the Region of Šumadija and Western Serbia. In this Region there have been grown on private family farms almost 60% of all sheep grown in Serbia.

However, the big problem in sheep production in the hilly-mountainous areas is provision the high-quality forage, especially during the winter season, because the vegetation period is short.

Autochthonous production of milk and cheese has been preserved in households of hilly-mountainous areas. In those areas the basic branch of agriculture is livestock and within it the production of milk and meat occupies the most important place. One of the most famous indigenous dairy products characteristic for the whole area of Serbia is the sheep cheese. It belongs to the group of white cheeses in brine and it has been produced as a traditional cheese from sheep or mixed sheep and cow's milk (Jovanović et al., 2004).

Sheep production in Republic of Serbia is characterized by low productivity, poor quality of products, extensive way of growing and permanently decline in the number of sheep. Although our country has favorable natural conditions for development of sheep production, Serbia has been still deficient in the production of meat, milk and dairy products (Sredojević and Popović, 2014).

The most common sheep breed in Serbia is Pramenka. This is a sheep with triple production capacity, because it is grown for the production of milk, meat and wool. There are several breeds of Pramenka: Sjenica or Pester sheep, Svrljig sheep, Pirot sheep, Sarplanina sheep and some others breeds which are highly adapted to the reduced circumstances and conditions under which they have been grown.

Pramenka is primitive sheep and it is a result of the poor nutrition and care conditions, to which it has been well adapted during long period of time. It is very resistant and durable. Pramenka was once widespread throughout Europe (France, Germany, England, Romania and Hungary). By intensification of agricultural production Pramenka was replaced by better sheep breeds, but this breed has been maintained to a large percentage in Southern Europe, especially on the Balkans (Krajinović, 2006).

Materials and methods

For the analysis of economic indicators in sheep production, there have been used different organizational and economic models. Modeling is a form of simulation in which it is possible to see all organization, economic and investment aspects of sheep production on family farms. Through modeling it could be simply solved many problems that are typical for this type of agricultural production. Creating of model is necessary when it is impossible to show the real state with all validity and relations. These observations could be applied to all economic entities, including the family farms.

The family farms models represent a group of economic, production-business and organization models (Tomic, 1994). During the creation of the family farm models directed to the sheep production, an attention has been focused on the following criteria: the intensity of animal feed production, intensity of sheep production, type of meals and farm size (Krstić et al., 1995). Beside the mentioned criteria, in creation of the models it is necessary to pay attention to the size of land area as well as the type of the sheep production (Bulatović, 1996).

The main objective of this research was to determine the economic indicators (production value and costs) achieved in sheep production. In addition the focus was on possibility of increasing the total production value of the observed family farms, because in addition to the production of lambs and lamb meat on the family farms, it is also present the milk processing into the high quality sheep cheese.

For analysis of obtained data, it was used the analytical calculations based of variable costs so-called Direct cost calculation. In addition to that, there have been used the following methodological tools: description, analysis, synthesis, comparison and methods of descriptive statistics. Results are presented in the form of tables.

A questionnaire was created for research purposes at the family farms. For every analyzed family farm there were made particular versions for lower and higher levels of intensity, depending on: forage production, the sheep production intensity and type of meals.

Results and discussions

As the family farms have an important place in the production and resources in Serbian agriculture, it requires to be determined the economic results of those farms. Economic indicators of production can be monitored if the farm regularly recorded production costs and results (Popović, 2012). Unfortunately, most farmers do not keep nor present the operating costs and results, even the simplest indicators.

The theoretical basis for the preparation of analytical calculation and determination of the production costs has been obtained in the direct costing method developed in USA, according to which the calculation of individual production line costs includes only those costs that change in proportion to the changes in production volume – i.e. variable costs (Andrić, 1998).

In these calculations, in addition to the variable costs, it is calculated the production value, and the corresponding operating result which comes from the difference between the production value and the variable costs. This result is marked in literature by different names such as contribution margin, gross margin, the margin of coverage, net income (Gogić, 2009).

The gross margin shows the result which after covering variable costs remains to cover fixed costs and to achieve the positive financial results (Vasiljević, Subić, 2010).

Formulation of the sheep production models with 100 sheep per model

The starting assumptions in the model are that the family farm is located in the hilly-mountainous region, at an altitude of more than 1000 meters, and that it is oriented exclusively on sheep production. Sheep production in the family farm model means the production of meat (lambs and culled sheep), sheep milk and cheese as well as wool. The size of the farm is 100 sheep. The farm in the model is also dealing with crop production, which is fully utilized to provide the necessary animal feed for a sheep. The most field crops on the farm are barley and oat as the feed grains and hay is supplied from the natural pastures or cultivated fields and it serves as forages. Concentrates and other supplements are purchased on the market. The labor activities on the family farm have been carried out by the family farm members, and those are primarily operations involving in sheep milking and processing of milk into sheep cheese, then herding of sheep in the pastures, mowing meadows and hay making, cleaning stables for sheep, cultivation and alike. The assumption is the family farm has its own equipment, machinery for farming and sheep production and ground objects for cattle.

Assumption in the model is that the family farm has 20 hectares of land from which 15 ha is arable land and meadows and remaining 5 ha are pastures. Sheep are pregnant around 150 days, the lambs suckling 3 months, but after a month it has been added the hay. Length of the grazing period is from April to November or December, until the snow thickness exceeds 10 cm. The summer meal consists of pasture grass, while in winter meal there have been given the hay and grains (barley and oat). The farm uses public meadows and pastures.

Based on the intensity of crop and sheep production, it is possible to form 4 family farm models (Table 1).

Table 1. Models of family farms according to the level of crop and sheep production intensity

Serial number	Symbol	Level of production intensity		Number of sheep
		Crop production	Sheep production	
01.	A	extensive	extensive	100
02.	B	intensive	extensive	100
03.	C	extensive	intensive	100
04.	D	intensive	intensive	100

Source: Author's research

Crop production

The research of economic parameters of sheep production is based on the determination of total production value and production costs. Lambs that have low body weight are not suitable for sale, but they must weigh 35 to 40 kg in 3-4 months. Only then, the animal which reach this weight, may be sold as breeding material or to the slaughterhouse.

Table 2. Costs of production per 1 ha of oat – extensive crop production

Indicators	Unit of measure	Volume	Price (€)	Sum (€)
1. Production value				
- grain	kg	2,100	internal realization	
- straw	kg	1,700	internal realization	
2. Direct variable costs				
- fertilizers	kg	340	0.36	122.4
- chemicals	l	3	7.2	21.6
- fuel	l	124.12	1.2	148.9
- engine oil	l			6.0
- services of harvest	ha			80.0
- insurance	€			3.8
- interest on the credit for operating capital	€			6.1
- other variable costs	€			4.2
Total costs				**393**

Source: Author's calculation

The calculation of certain categories of production value and costs is based on natural indicators that are determined on the basis of the survey conducted on the family farms. The calculation of production value and costs intended to get the realistic picture of the financial results obtained at the concrete family farms. In this way it is ensured that the resulting economic parameters have not only the local, but also the general importance (Popović, 2016).

In the case of extensive crop production, the average yield of oat grains is 2.1 t/ha, while the yield of oat straw is 1.7 t/ha. The average yield of barley grain is 2.2 t/ha, but the yield of barley straw is 1.8 t/ha. In extensive crop production, it is applied one plowing, and with reduced fertilization of crops, as well as it is obtained lower yield compared to the intensive crop production. In extensive crop production, yield of hay from natural meadow is 2.1 t/ha, while the hay from cultivated meadow is 5.4 t/ha (Tables 2-5).

Table 3. Costs of production per 1 ha of barley – extensive crop production

Indicators	Unit of measure	Volume	Price (€)	Sum (€)
1. Production value				
- grain	kg	2,200	internal realization	
- straw	kg	1,800	internal realization	
2. Direct variable costs				
- fertilizers	kg	350	0.36	126.0
- chemicals	l	3	7.2	21.6
- fuel	l	124.12	1.2	148.9
- engine oil	l			6.0
- services of harvest	ha			80
- insurance	€			4.2
- interest on the credit for operating capital	€			6.3
- other variable costs	€			4.0
Total costs				**397**

Source: Author's calculation

Table 4. Costs of production of 1 ha of hay from the natural meadows – extensive crop production

Indicators	Unit of measure	Volume	Price (€)	Sum (€)
1. Production value				
- straw	kg	2,100	internal realization	
2. Direct variable costs				
- fertilizers	kg	230	0.36	82.8
- fuel	l	31.32	1.2	37.6
- engine oil	l			1.50
- other variable costs	€			5.1
Total costs				**127**

Source: Author's calculation

The selection of crops that can be grown in the mountainous areas is very narrow. Thus, on the arable lands there can be grown only barley and oat. It is assumed that farmers have their own seeds for planting crops - oat and barley. The model is based on the assumption that the norms the oat, barley and grass seed (meadows sown) per 1 ha which do not change and that they are the same for extensive and intensive crop production.

Norms of mineral fertilizers (kg/ha) in the extensive crop production are as follows: for oat 340 kg/ha, for barley 350 kg/ha, for sown meadows 330 kg/ha and for natural meadows 230 kg/ha. In the intensive crop production norms of mineral fertilizers are as follows: for oat 550 kg/ha, for barley 590 kg/ha, for sown meadows 580 kg/ha and for natural meadows 430 kg/ha.

Table 5. Costs of the hay production from the sown meadows per 1 ha – extensive crop production

Indicators	Unit of measure	Volume	Price (€)	Sum (€)
1. Production value				
- straw	kg	5,400	internal realization	
2. Direct variable costs				
- seed	kg	36	3	108.0
- fertilizers	kg	330	0.36	118.8
- chemicals	l	3	7.2	21.6
- fuel	l	240.12	1.2	288.1
- engine oil	l			11.5
- insurance	€			4.8
- interest on the credit for operating capital	€			7.0
- other variable costs	€			5.2
Total costs				**565**

Source: Author's calculation

Table 6. Costs of oat production per 1 ha – intensive crop production

Indicators	Unit of measure	Volume	Price (€)	Sum (€)
1. Production value				
- grain	kg	2,800	internal realization	
- straw	kg	2,300	internal realization	
2. Direct variable costs				
- fertilizers	kg	550	0.36	198.0
- chemicals	l	4.44	7.2	32.0
- fuel	l	129.92	1.2	155.9
- engine oil	l			6.2
- services of harvest	ha			80.0
- insurance	€			9.1
- interest on the credit for operating capital	€			15.4
- other variable costs	€			13.4
Total costs				**510**

Source: Author's calculation

In the case of intensive crop production, the average yield of oat grains is 2.8 t/ha, while the yield of oat straw is 2.3 t/ha. The average yield of barley grain is 3.2 t/ha, but the yield of barley straw is 2.4 t/ha. Yield of hay from natural meadow is 3.1 t/ha, while the silage from cultivated meadow is 22.13 t/ha (Table 6-9).

Norms of tractor use (hour/ha) in the extensive crop production are as follows: for oat 21.4 hours/ha, for barley 21.4 hours/ha, for cultivated meadows 41.4 hours/ha and for natural meadows 5.4 hours/ha. In the intensive crop production this norms are: for oat 22.4 hours/ha, for barley 22.0 hours/ha, for cultivated meadows 48.3 hours/ha and for natural meadows 6.5 hours/ha. The assumption is that the fuel consumption per hour is 5.8 liters.

Table 7. Costs of barley production per 1 ha – intensive crop production

Indicators	Unit of measure	Volume	Price (€)	Sum (€)
1. Production value				
- grain	kg	3,200	internal realization	
- straw	kg	2,400	internal realization	
2. Direct variable costs				
- fertilizers	kg	590	0.36	212.4
- chemicals	l	4.44	7.2	32.0
- fuel	l	127.6	1.2	153.1
- engine oil	l			6.1
- services of harvest	ha			80
- insurance	€			8.9
- interest on the credit for operating capital	€			14.6
- other variable costs	€			13.9
Total costs				**521**

Source: Author's calculation

Table 8. Costs of hay production from natural meadows per 1 ha – intensive crop production

Indicators	Unit of measure	Volume	Price (€)	Sum (€)
1. Production value				
- hay	kg	3,100	internal realization	
2. Direct variable costs				
- fertilizers	kg	430	0.36	154.8
- fuel	l	37.7	1.2	45.2
- engine oil	l			1.8
- other variable costs	€			13.2
Total costs				**215**

Source: Author's calculation

Table 9. Costs of silage production from cultivated meadows per 1 ha – intensive crop production

Indicators	Unit of measure	Volume	Price (€)	Sum (€)
1. Production value				
- silage	kg	22,130	internal realization	
2. Direct variable costs				
- seed	kg	36	4	144.0
- fertilizers	kg	580	0.36	208.8
- chemicals	l	6.0	7.2	43.2
- fuel	l	280.14	1.2	336.2
- engine oil	l			13.4
- insurance	€			13.8
- interest on the credit for operating capital	€			16.8
- other variable costs	€			13.8
Total costs				**790**

Source: Author's calculation

The needed amount of forage at models of family farms for extensive and intensive crop and sheep production, average yields and necessary arable land are given in table 10.

Table 10. The required annual mount of forage per farm, average yields and farmland for extensive and intensive crop and sheep production

Type of forage	Amount of forage (t)	Yield (t/ha)	Farmland (ha)
Extensive crop production - extensive sheep production (model A)			
- oat	3.27	2.1	1.56
- barley	1.57	2.2	0.71
- natural meadow hay	38.09	2.1	5.08
- cultivated meadow hay		5.4	5.08
- pasturage	91.94	0.7	-
- concentrate	3.45	-	-
Intensive crop production - extensive sheep production (model B)			
- oat	3.27	2.8	1.17
- barley	1.57	3.2	0.49
- natural meadow hay	7.62	3.1	2.46
- grass silage	75.44	22.13	3.41
- pasturage	91.94	1.2	-
- concentrates	3.45	-	-
Extensive crop production - intensive sheep production (model C)			
- oat	3.89	2.1	1.85
- barley	1.87	2.2	0.85
- natural meadow hay	50.26	2.1	6.70
- cultivated meadow hay		5.4	6.70
- pasturage	107.59	0.7	-
- concentrates	5.79	-	-
Intensive crop production - intensive sheep production (model D)			
- oat	3.89	2.8	1.39
- barley	1.87	3.2	0.58
- natural meadow hay	10.44	3.1	3.37
- grass silage	98.56	22.13	4.48
- pasturage	107.59	1.2	-
- concentrates	5.79	-	-

Source: According to Krstic et al., 1995.

Based on the table 10, the total area of arable land for forage production amounts to the following: model A 12.43 ha, model B 7.53 ha, model C 16.10 ha and model D 9.82 ha. From 4 tested models, one model (model C) does not satisfy the assumption that arable land amounts to 15 hectares. In this case, the needed forage quantity will be provide by renting of certain areas.

Sheep production

Differences between the defined models are mainly related to the fact whether the production is of extensive or intensive type. In extensive sheep production the sheep fertility is lower, the lower is the production of milk and thus the quantity of the cheese is lower. The intensive sheep production implies the higher investment and the economic effects of the sold lambs and cheese will be higher as well. Also it is higher the average annual number of lambs. In addition, there are differences in weight of adult culled sheep and rams, as well as in wool production, depending on the fact is it obtained in extensive or intensive sheep production. Zoo-technical and production indicators of sheep production are given in table 11.

Table 11. Basic zoo-technical and production indicators of sheep production on family farms

Indicators	Sheep production	
	Extensive	Intensive
1. Exploitation period of breeding animals (years):		
- sheep	6	5
- rams	5	4
2. Fertility of sheep (%)	105 – 110%	120 – 130%
3. The number of sheep per breeding ram	33	25
4. Lambs mortality (%)	4	5
5. Restoration (repair) of the flock (%)	17	20
6. Body volume (kg):		
- female lambs at birth	3.0 – 3.2	3.6 – 3.8
- male lambs at birth	3.2 – 3.4	3.8 – 4.0
- female lambs when they are selling	28	30
- male lambs when they are selling	32	34
- adult culled sheep	52	60
- adult culled ram	70	85
7. Annual milk production per breeding ewe (kg) *	54 – 57	60 – 65
8. Annual production of cheese per breeding ewe (kg)	9.0 – 9.5	10.0 – 10.8
9. The annual production of wool (kg)		
- per sheep	2.0	2.4
- per ram	2.5	3.0

** Not included the quantity of milk that lambs suckle*

Source: Author's calculation based on the questionnaire

The model A with 100 sheep and 3 rams gets about 105 lambs per year. If mortality of lambs is 4% and if some of the lambs are used for household purposes (5 lambs per year), in total will remain 96 lambs (48 female lambs and 48 male lambs). Out of 48 female lambs, 17 is used for renewal of the flock, i.e. they are left to "repair" the flock, as well as 1 male lamb. For sale remain: 47 male lambs, 31 female lambs, 17 sheep and 1 ram.

In a similar way can be calculated the number of lambs that could be sold in other family farm models. Thus, in B model there could be sold 33 female lambs, 49 male lambs, 17 sheep and 1 ram. In C model there could be sold 37 female lambs, 56 male lambs, 20 sheep and 1 ram. In D model there could be sold 39 female lambs, 58 male lambs, 20 sheep and 1 ram.

Calculation of production value, costs and gross margin in the family farm models

Based on zoo-technical and production indicators of sheep production on family farms, it was calculated the total production value (table 12). In this case the value of production is identified with total revenues (income) that are realized on the family farms.

Table 12. Total value of production (income) on the family farms

Indicators	Unit	Quantity	Price (€)	Value (€)
Model A – extensive crop and extensive sheep production				
1. Production value:				
- lambs	kg	2,372	2.3	5,455.6
- culled sheeps and rams	kg	954	1.8	1,717.2
- milk	l	4,500	/	3,375*
- wool	kg	207.5	0.65	134.9
Total production value – model A				**10,682.7**
Model B – intensive crop and extensive sheep production				
1. Production value:				
- lambs	kg	2,492	2.3	5,731.6
- culled sheep and rams	kg	954	1.8	1,717.2
- milk	l	4,752	/	3,564*
- wool	kg	207,5	0.65	134.9
Total production value – model B				**11,147.7**
Model C – extensive crop and intensive sheep production				
1. Production value:				
- lambs	kg	3,014	2.3	6,932.2
- culled sheep and rams	kg	1,285	1.8	2,313.0
- milk	l	4.860	/	3,645*
- wool	kg	252	0.65	163.8
Total production value – model C				**13,054**
Model D – intensive crop and intensive sheep production				
1. Production value:				
- lambs	kg	3,142	2.3	7,226.6
- culled sheep and rams	kg	1,285	1.8	2,313.0
- milk	l	5,160	/	3,870*
- wool	kg	252	0.65	163.8
Total production value – model D				**13,573.4**

* Value of the cheese produced from the quantity of milk.

Source: Author's calculation based on the questionnaire

In tables 13, 14, 15 and 16 there are calculated the total variable costs which are realized on family farms when crop and sheep production are within extensive or intensive type. It can be seen from the tables that the most amount of costs belongs to the costs of sheep feed. The largest share in the structure of variable costs have hay from the cultivated meadows (42.14% - 43.08%), then the grass silage (41.32% - 41.96%) and finally form the concentrates (13.17% - 17.85%).

Table 13. Total variable costs on the family farm – model A

Variable costs	Description	Value (€)	Structure (%)
- oat	1.56 ha · 393 €/ha	613.1	9.00
- barley	0.71 ha · 397 €/ha	281.9	4.14
- hay from natural meadows	5.08 ha · 127 €/ha	645.2	9.47
- hay from cultivated meadows	5.08 ha · 565 €/ha	2,870.2	42.14
- concentrates	3.45 t · 260 €/t	897.0	13.17
Variable costs	**Description**	**Value (€)**	**Structure (%)**
- animal salt	0.36 t · 500 €/t	180.0	2.64
- mineral-vitamin supplements	0.12 t · 1,200 €/t	144.0	2.11
- health care for livestock		200.0	2.94
- use of public pastures		130.0	1.91
- insurance of livestock		224.0	3.29
- interest on the credit for operating capital		102.0	1.50
- other costs		523.0	7.68
Total variable costs		**6,810.4**	**100**

Source: Author's calculation

Table 14. Total variable costs on the family farm – model B

Variable costs	Description	Value (€)	Structure (%)
- oat	1.17 ha · 510 €/ha	596.7	9.15
- barley	0.49 ha · 521 €/ha	255.3	3.91
- hay from natural meadows	2.46 ha · 215 €/ha	528.9	8.11
- grass silage	3.41 ha · 790 €/ha	2,693.9	41.32
- concentrates	3.45 t · 260 €/t	897.0	13.76
- animal salt	0.36 t · 500 €/t	180.0	2.76
- mineral-vitamin supplements	0.12 t · 1,200 €/t	144.0	2.21
- health care for livestock		210.0	3.22
- use of the public pastures		130.0	1.99
- insurance of livestock		224.0	3.43
- interest on the credit for operating capital		108.0	1.66
- other costs		552.0	8.47
Total variable costs		**6,519.8**	**100**

Source: Author's calculation

Table 15. Total variable costs on the family farm – model C

Variable costs	Description	Value (€)	Structure (%)
- oat	1.85 ha · 393 €/ha	727,1	8.27
- barley	0.85 ha · 397 €/ha	337,4	3.84
- hay from natural meadows	6.70 ha · 127 €/ha	850.9	9.68
- hay from cultivated meadows	6.70 ha · 565 €/ha	3,785.5	43.08
- concentrates	5.79 t · 260 €/t	1,505.4	17.13
- animal salt	0.36 t · 500 €/t	180.0	2.05
- mineral-vitamin supplements	0.12 t · 1,200 €/t	144.0	1.64
- health care for livestock		220.0	2.50
- use of the public pastures		130.0	1.48
- insurance of livestock		224.0	2.55
- interest on the credit for operating capital		110.0	1.25
- other costs		573.0	6.52
Total variable costs		**8,787.3**	**100**

Source: Author's calculation

Table 16. Total variable costs on the family farm – model D

Variable costs	Description	Value (€)	Structure (%)
- oat	1.39 ha · 510 €/ha	708.9	8.40
- barley	0.58 ha · 521 €/ha	302.2	3.58
- hay from natural meadows	3.37 ha · 215 €/ha	724.6	8.59
- grass silage	4.48 ha · 790 €/ha	3,539.2	41.96
- concentrates	5.79 t · 260 €/t	1,505.4	17.85
Variable costs	**Description**	**Value (€)**	**Structure (%)**
- animal salt	0.36 t · 500 €/t	180.0	2.13
- mineral-vitamin supplements	0.12 t · 1,200 €/t	144.0	1.71
- health care for livestock		230.0	2.73
- use of the public pastures		130.0	1.54
- insurance of livestock		224.0	2.66
- interest on the credit for operating capital		133.0	1.58
- other costs		614.0	7.28
Total variable costs		**8,435.3**	**100**

Source: Author's calculation

On the second place in the structure of variable costs, there are costs of oat, barley and hay production from natural meadows. Other costs include the costs of the milk processing into the sheep's cheese, electricity and disinfectants costs.

From the calculated production value and costs, it can be calculated the gross margin realize on the family farms: 10,682.7 – 6,810.4 = 3,872.3 €/year. In other words, the gross margin per sheep amounts to 38.72 €.

Analytical calculation based on variable costs (*Direct costing method*) is particularly suitable for calculation of the production costs and results at the family farms. By the direct costing method there could be determined the value of production, variable

costs and gross margin. The gross margin represents an intermediate result or financial indicator in which consists from a part which covers the fixed costs and the part which represent the profit. In other words, the gross margin shows the amount after covering the variable costs that rests for covering the fixed costs and achieved positive financial result. The gross margin is calculated when the variable costs are deducted from the value of production. In this way it was calculated the gross margin which has been realized in different family farm models (table 17).

Table 17. Total value of production, variable costs and gross margin at analyzed models

Models	Value of production (€)	Variable costs (€)	Gross margin (€)
Model A	10,682.7	6,810.4	3,872.3
Model B	11,147.7	6,519.8	4,627.9
Model C	13,054.0	8,787.3	4,266.7
Model D	13,573.4	8,435.3	5,138.1

Source: Author's calculation

The gross margin coverage is the highest in the model D with intensive crop production and intensive sheep production and it amounts to 5,138.1 €. In contrast, in model A, with the extensive type of crop and sheep production it has been achieved the minimal value of production and relatively high variable costs, resulting in the gross margin of 3,872.3 €. Under the conditions of extensive sheep production, the best economic indicators have been achieved in the model B. In intensive sheep production the best economic results have been achieved in the model D. Also, the model B has a lower value of production and lower variable costs (6.519.8 €) in comparison with the model C, but still achieves the higher gross margin, because at model C the variable costs are the highest (8,787.3 €).

Conclusion

The Republic of Serbia is a country where agriculture occupies an important place in the overall economic structure. Favorable natural and climatic conditions and rich land resources enable the organization and implementation of economically justified agricultural production. Sheep production is of increasing importance for the overall agricultural production.

The hilly-mountainous regions of Serbia represent a significant potential for the economic development of the country. The sheep production which can be organized in those regions has comparative advantages in relation to some other productions that could not be successfully organized in those regions. They are particularly convenient for the hilly-mountain family farms.

In order to examine the profitability sheep production on the hilly-mountain family farms in different level of intensity concerning the crop production and sheep production, there have been constructed 4 models of sheep production which differ in intensity of crop

and sheep production (A model extensive crop production – extensive sheep production, B model - intensive crop production - extensive sheep production, C model extensive crop production – intensive sheep production and Model D - intensive crop production – intensive sheep production). The economic indicators of production have shown that adequate care and nutrition of sheep contribute to the achievement of the successful economic results. The best economic results have been achieved in the Model D.

A common feature of all models is that on the basis of obtained results it can be concluded these models are reliable and can be applied in real business conditions, particularly in the case of the hilly-mountain family farms.

Conflict of interests

The author declare no conflict of interest.

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MARKET PRODUCTION OF MEAT AS A FACTOR OF THE ACHIEVED LEVEL OF DEVELOPMENT OF SERBIAN AGRICULTURE

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ABSTRACT

In the paper, the mutuality of the market production of beef, pigmeat, sheep meat and poultry meat and the achieved level of development of agriculture as per Serbia's districts in the period from 2001 to 2016 are analyzed. The ranking of districts in Serbia is done by the I-distance method. Similarities are determined by cluster analysis method, while results are represented by a dendrogram. Belgrade District shows a deficit in the market production of all meats. In the three districts of Vojvodina Region, there is a deficit in sheep meat and in the two districts, there is a deficit in poultry meat. The three districts of Sumadija and Western Serbia Region, there is a deficit in the production of pigmeat and poultry meat. The Region of Southern and Eastern Serbia has a deficit in the production of poultry meat.

Introduction

In the development of Serbia's economy, agriculture has provided accumulation and workforce for the development of non-agricultural activities, raw materials for the processing industries, a major user of the outputs of industrial products, and the significant harmonization of the country's foreign-trade balance. Activities in agriculture have an influence on the protection and improvement of the living environment and the concept of sustainable development. For that reason today, agriculture is said to be playing a multifunctional role in economic development.

The growth of the living standard and quality of nutrition of a population has an influence on increased demand for livestock products. The interdependence of

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economic development, personal income and livestock production is important for defining the developmental policy of agriculture, and livestock production within it. Apart from their positive effects, global business and economic development during the last decades have also resulted in numerous negative effects that have become apparent in the field of human nutrition and health. Various forms of pollution, as well as inappropriate nutrition, have initiated new trends in nutrition, such as organic, macrobiotic, functional, etc. Some are the consequence of the global economic strategy or the limits of the existing resources, and as often as not, they are the consequence of economic and political interests (Stevanović, 2005).

The development of agriculture in Serbia primarily depends on soil and natural conditions. This is indicative of the need for territorialization in order to achieve better results in agriculture, especially in plant and livestock production, which are directly dependent upon natural conditions. Using comparative natural advantages contributes to the uniform territorial development of Serbia.

As a significant economic branch in every country, agriculture has its locomotive of development, which namely is animal husbandry. Animal husbandry also has its main artery represented by milk production. The previously established fact enables us to conclude that agriculture and animal husbandry are interwoven, that animal husbandry leans against agriculture and represents a higher stage of agricultural products (Tomić, D., Simonović, V., 2008).

For the reason of the specificity of production and developmental features, the paper starts from the hypothesis that in Serbia, the regionalization of the production of meat (beef, pigmeat, sheep meat and poultry meat) is pronounced. Even though livestock production depends on natural conditions to a lesser degree than crop production, the distinct regionality of the production of each one of the analyzed meats can be spoken about. The presence of these types of production and an increase in marketability are assumed to have a positive influence on total agricultural, i.e. the achieved level of economic development of the districts in Serbia.

The goal of the paper is to analyze the development of the market production of meat as per districts in Serbia on the basis of the three groups of features: production, capacities and the achieved level of development. On the basis of these features, the I-distance[4] was used to rank the districts in Serbia.

The results of the research study of the features of the capacities, production and development represent a good basis for implementing production regionalization and pursuing an agrarian policy towards the districts that belong to the same cluster.

Method of Work and Data Sources

By analyzing the production of meat as per districts in Serbia, it has been determined that there is a connection between the volume of meat production, the available capacities and the achieved development level.

4 Ivanović's Distance.

During the analysis of the market production of meat, the territorial organization of Serbia was taken into account. The Serbian territory is presented according to the Regulation on the Nomenclature of the Statistical Territorial Units. With respect to its territorial organization, Serbia applies the EU standards in the domain of statistical organizing (NUTS and LAU levels). The NUTS-1 Level of Serbia encompasses two regions (Serbia-North and Serbia-South). The NUTS-2 Level of Serbia encompasses five regions (Vojvodina Region, Belgrade Region, Šumadija and Western Serbia Region, Southern and Eastern Serbia Region and the Region of Kosovo and Metohija). The NUTS-3 Level encompasses 25 districts, and the NUTS-4 Level encompasses municipalities in Serbia (Devetaković, 2008).

The ranking of the districts by the I-distance method was done on the basis of the three groups of features: a) production (8, from x_1 to x_8): x1-beef production as per districts, x2-pigmeat production as per districts, x_3-sheep meat production as per districts, x_4-poultry meat production as per districts, x_5-the marketability degree of beef as per districts, x_6-the marketability degree of pigmeat as per districts, x_7-the marketability degree of sheep meat as per districts, x_8-the marketability degree of poultry meat as per districts; b) the capacities (7, from x_9 to x_{15}): x_9-the number of bovines as per districts, x_{10}-the number of pigs as per districts, x_{11}-the number of sheep as per districts, x_{12}-the number of poultry as per districts, x_{13}-the number of bovines on 100 ha of arable area, x_{14}-the number of pigs on 100 ha of a ploughland area, x_{15}-the number of sheep on 100 ha of an agricultural area, and c) the level of achieved development (5, from x_{16} to x_{20}): x_{16}-ND/per capita, x_{17}-the percentage of the non-agricultural population, x_{18}-the percentage of an increase/decrease in the number of inhabitants in 2015 in comparison with 2002, x_{19}-the share of agriculture in the ND of the economy and x_{20}-the share of industry in the ND of the economy.

On the basis of the data as per municipalities, a fact has been established that there is a significant difference between the mean value and the median calculated for the data at the district level because the analyzed features as per municipalities do not represent the normal distribution of data at the district level. The ranking of the districts according to the analyzed features has been done on the basis of the values of the median as per municipalities.

For each one of the mentioned groups of features (production, capacities, the achieved level of development), the I-distance (Ivanović, B. 1972, 1973, 1977, Ivanović, B., Fanchette, S., 1973, Docampo, D., 2011, Jeremić, 2012, Docampo, D., 2011, Hauner, D., Kyobe, A., 2010, Nita, V. 2011), (Formula 1) was applied to rank the districts from 1 to 25 (Rank 1–the best, Rank 25–the worst).

$$D_k = \sum_{i=1}^{n} \frac{|X_{1k} - X_1^-|}{S_1} \prod_{j=1}^{i=1} (1 - r_{ij}) \quad (1)$$

By applying a cluster analysis, the homogeneous groups of the districts in Serbia were defined from the standpoint of the volume of the production of beef, pigmeat, sheep meat and poultry meat. The similarities of the districts according to the analyzed features of meat production were defined by the Euclidean measure of distance, and the complete-link method was applied to perform the grouping of the Serbian districts.

The obtained results of the hierarchical classification are represented by a dendrogram.

For the analysis of the features of production and the capacities (x_1-x_{15}), the data of the publication entitled Municipalities in the Republic of Serbia in 2015 by the Republic Statistical Office were used. No data as per districts for the features of the achieved development level (x_{16}-x_{20}) have been published since 2006, so for those features, the publication entitled Municipalities in the Republic of Serbia in 2005 was used (Stevanović at al, 2011, 2012, 2016.).

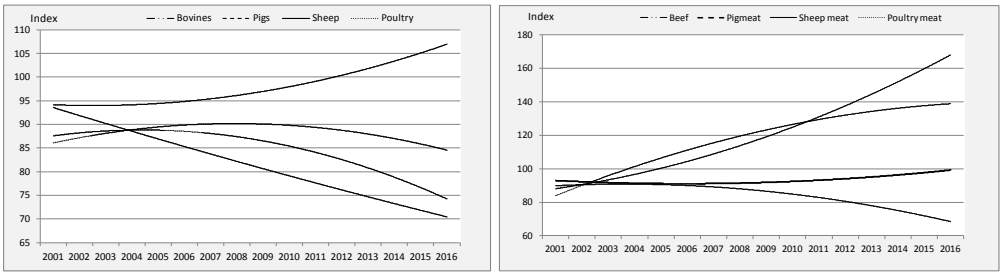
Results and Discussion

Marketability of Meat Production

The volume of the production of livestock products is primarily influenced by the number and productivity of cattle. They are tightly interconnected, although their significance changes during economic development. Having in view the fact that in the postwar stages of the development of the Serbian economy the productivity of the head was low, the number of cattle had a key influence on the development of the production of livestock products. In later economic development, by the selection and regime of the feeding of the head of cattle, productivity became the decisive factor for the production of livestock products.

Figure 1. Indices of the number of cattle and the production of beef, pigmeat, sheep meat and poultry meat in Serbia in 2001-2016

(Cattle) (Meat)



Source: Processed by the Author on the basis of the data of the Republic Statistical Office, Belgrade

In the period from 2001 to 2016 (Figure 1), the number of sheep increased by 11.8%, from 1.49 to 1.67 mill. head (the growth rate of 0.74%), whereas the number of bovines, pigs and poultry significantly decreased. The number of bovines was reduced by 23.1%, from 1.2 to 0.9 mill. head (the growth rate of -1.74%), pigs by 16.4%, from 3.6 to 3.0 mill. head (the growth rate of -1.18%) and poultry by 15.8%, from 19.3 to 16.2 mill. head (the growth rate of -1.14%).

A big fluctuation in the number of the livestock population, which is applicable to

Serbia, causes deep negative consequences in a longer time period (Mijić, at al, 2014). Therefore, it is needed to mitigate not only the variation degree, but also the consequences that arise in animal husbandry, or agricultural production.

Given the significance of bovine breeding, the reduction in the number of the bovine head in Serbia by almost one-fourth will negatively reflect on the overall animal husbandry. The negative tendency in bovine breeding is all the more complex if we bear in mind the length of the reproduction cycle and the structure of the herd.

Insufficient food production, market instability, a reduction in the export of livestock products, cattle and concentrated animal feeding stuffs price disparities and the process of the differentiation of the rural population and the presence of agricultural workforce had the biggest influence on the reduction in the number of bovines. The stated factors have a negative influence on the degree of the utilization of the production potentials of the livestock population, which are reflected in a lower volume of production, productivity and income as per employee. A greater utilization of the production potential would contribute to an increase in animal husbandry, and simultaneously to productivity and revenues in cattle breeding. These tendencies[5] are especially pronounced in the highland regions of Serbia, where cattle breeding is actually present to the greatest extent.

Not diminishing the significance of bovine breeding and pig breeding, sheep breeding in the Republic of Serbia has a special significance given the highland area, the favorable climatic conditions and available areas under meadows. For some regions (Nišava District and Pirot District), sheep breeding represents a significant, whereas sometimes the only one, source of income for farms and the population. Although it has favorable conditions for the development of sheep breeding, Serbia is deficient in some products (Wool, lamb, milk, milk products) of sheep breeding. In the world market, there has been ever-increasing demand for sheep-breeding products, which represents a chance that Serbia can use in the exporting orientation of agriculture (Ranđelović, Pavlović, 2000).

The production of meat[6] is contingent upon the number, structure and breed composition of cattle, a yield in liveweight, the volume of slaughter and foreign-trade exchange (Đorović, Tomin, 2010). In the 2001-2016 period (Table 1), the total[7] average annual production of meat was 453.0 thous. tons, with the annual oscillation of ±22.5 thous. tons and the growth rate of 1.09% per annum. Observed as per meats, the production of beef recorded a negative growth tendency, whereas the production of pigmeat, sheep meat and poultry meat had a positive growth tendency. The average annual production

5 It is reflected in the low average weight of the head, its insufficient fatness, a loss in weight during the winter due to bad nutrition, the premature separation of young head from the herd or the fattening head, the bad structure of the herd, bad stable conditions for keeping the head and so on.

6 The production of meat, in total and as per kinds, represents the so-called meat production in the country, i.e. the meat of slaughtered cattle at the butchers' households and agricultural farms.

7 Beef, pigmeat, sheep meat and poultry meat.

of beef was 87.6±9.87[8] thous. tons (70-100 thous. t.)[9], with the negative average annual growth rate of -1.25%, pigmeat 263.9±15.98 thous. tons (242-301 thous. t.), with the growth rate of 1.16%, sheep meat 22.9±5.20 thous. tons (242-301 thous. t.), with the growth rate of even 4.73% annually and poultry meat 453.2±22.55 thous. tons (420-500 thous. t.) and the growth rate of 1.09%.

The data about the standard deviations of the analyzed production of different meats are indicative of the existence of a big annual oscillation in their production, which is negatively reflected on the stability of the offer in the national market, as well as export.

According to the data about the simple correlation coefficients[10] of the number of cattle and meat production, a conclusion can be drawn that the production of beef and sheep meat is significantly influenced by the number of cattle, whereas it is not the case with the production of pigmeat and poultry meat. The stated is indicative of the fact that the other factors, such as productivity as per head and similar factors, have greater significance for the production of pigmeat and poultry meat. According to (Vlahović, et al. 2006), the production of sheep meat depends on the number and structure of the slaughtered head, the average weight of the slaughtered head, the fatness condition[11], the genetic characteristics of the breeds which are raised as well as the quality characteristics of meat.

The tendencies in production also had an influence on the change in the structure of meat as per kinds. Due to the negative tendencies in production, the share of beef was reduced from 21.9% (in 2001) to 15.4% (in 2016). The share of pigmeat remained unchanged, about 60.0%, whereas the share of sheep meat increased from 4.0% to 6.8% and poultry meat from 14.6% to 17.6%.

The stated data are indicative of the fact that, in the 2001-2016 period, the quantitative-qualitative structure of meat production in Serbia underwent change. The total production of meat increased quantitatively by around 17.6%. Observed as per meats, the production of beef decreased, whereas the production of pigmeat, sheep meat and poultry meat increased. Qualitatively[12], the tendencies in the volume of production as per meats were negative in the production of beef, pigmeat and poultry meat, whereas they were positive only in the production of sheep meat. Serbia has not yet achieved the level of development that will have an influence on change in the qualitative structure of meat production through increased consumption and demand (Milanović, Đorović, 2011).

Table 1. The structure of the production of beef, pigmeat, sheep meat and poultry meat in

8 The standard deviation.

9 Minimum and maximum production in the 2001-2016 period.

10 Bovines r-0.734975, pigs r-0.083248, sheep r-0.626408, poultry r-0.056325.

11 Fattened head have a substantially greater slaughter yield than meager head.

12 The growth of the living standard of a population leads to the following qualitative changes in the structure of meat consumption: there is an increase in the share of beef and sheep meat and a decrease in the share of pigmeat and poultry meat.

Serbia in 2001-2016

Years	Total (000 t)	Index (2001=100)	Structure (%)			
			Beef	Pigmeat	Sheep meat	Poultry meat
2001	425	100,0	21,9	59,5	4,0	14,6
2002	454	106,8	21,4	61,0	3,3	14,3
2003	429	100,9	22,1	60,1	4,0	13,8
2004	420	98,8	22,1	57,6	4,8	15,5
2005	431	101,4	20,9	58,7	4,9	15,5
2006	433	101,9	19,2	58,9	4,6	17,3
2007	474	111,5	20,0	61,0	4,2	14,8
2008	464	109,2	21,3	57,3	5,0	16,4
2009	456	107,3	21,9	55,3	5,3	17,5
2010	472	111,1	20,3	57,0	4,9	17,8
2011	479	112,7	16,9	56,6	5,0	21,5
2012	450	105,9	18,2	56,0	4,9	20,9
2013	441	103,8	15,9	56,5	6,8	20,9
2014	452	106,4	16,2	57,1	6,0	20,8
2015	471	110,8	16,3	59,0	6,4	18,3
2016	500	117,6	15,4	60,2	6,8	17,6

Source: Processed by the Author on the basis of the data of the Republic Statistical Office, Belgrade

The share of market production represents an important qualitative characteristic of every production. Market animal husbandry is guided by market economic requirements and needs. Profitable business doing according to the market criteria for production is based on contemporary technical-economic procedures and high productivity. Contrary to that, subsistence economy has a goal of meeting producers' needs and most frequently it is extensive and low-productive (Đorović, et al, 2009).

The relationship between the market and the subsistence parts of animal husbandry is also synthetically expressed by the overall relationship between the production factors and the social-economic conditions in which animal husbandry takes place. It reveals the possibilities and directions of the further development of animal husbandry. In that sense, studying the marketability of animal husbandry encompasses the measuring of the relationship between the market and the subsistence economy and finding out the tendencies in the production structure.

Table 2. The production of meat and the marketability degree as per regions and districts in Serbia in 2015

	Production (t)				Marketability degree (%)			
	Beef	Pigmeat	Sheep meat	Poultry meat	Beef	Pigmeat	Sheep meat	Poultry meat
REPUBLIC OF SERBIA (000 t)	85.6	263.9	24.3	85.4	16.4	15.6	27.0	16.9
SERBIA – NORTH (000 t)	28.8	124.0	4.9	42.1	-25.0	9.6	-81.9	15.3
Belgrade District	79.7	591.3	16.5	147.7	-378.7	-221.3	-938.1	-538.3
Vojvodina Region (000 t)	23.8	108.3	3.8	38.3	19.9	45.2	-24.3	50.6
Western Bačka District	644.2	1586.7	67.2	488.4	24.6	31.6	-68.0	19.0
Southern Banat District	301.4	1165.6	78.2	556.3	29.6	30.2	18.8	22.1
Southern Bačka District	282.6	1623.5	55.6	751.9	8.8	51.7	-19.0	41.6
Northern Banat District	533.4	1632.6	106.2	122.8	66.4	64.4	54.4	-23.3
Norhtern Bačka District	1109.2	6010.7	89.6	1235.2	46.2	29.4	-20.0	79.3
Middle Banat District	614.4	1090.9	112.4	861.1	62.1	51.0	46.0	73.2
Srem District	422.7	3360.1	59.7	570.2	20.1	66.9	4.5	-9.1
SERBIA – SOUTH (000 t)	56.8	139.9	19.4	43.3	37.5	20.9	54.6	18.5
Šumadija and Western Serbia Region (000 t)	39.0	89.2	14.7	29.7	49.0	30.6	66.4	33.5
Zlatibor District	625.7	416.5	340.0	124.4	51.8	-48.1	81.0	-42.1
Kolubara District	779.6	1539.7	301.2	616.9	74.5	66.9	83.0	62.9
Mačva District	736.0	2504.5	258.0	386.6	60.6	64.7	77.4	18.1
Moravica District	881.0	1215.9	379.8	213.3	57.5	-2.5	79.6	-61.0
Morava River Basin District	428.6	1214.5	146.0	718.1	21.6	30.6	30.8	63.0
Rasina District	400.1	1451.0	186.7	1199.1	25.7	29.5	32.5	58.6
Raška District	909.2	389.9	225.2	162.3	14.2	-89.9	45.4	-45.3
Šumadija District	410.5	1383.7	290.9	369.5	14.4	37.8	71.6	32.4
Southern and Eastern Serbia Region (000 t)	17.8	50.7	4.7	13.6	32.1	3.9	18.1	-14.0
Bor District	366.9	674.1	117.3	135.2	20.1	-40.1	34.2	-97.0
Braničevo District	267.7	1201.1	139.0	262.7	48.3	68.4	70.3	48.3
Zaječar District	485.8	814.3	171.6	171.3	44.3	42.2	65.6	-43.0
Jablanica District	235.4	546.6	39.0	170.4	53.8	-25.4	-51.5	-22.2
Nišava District	270.5	726.6	73.6	224.0	37.7	27.5	22.5	7.6
Pirot District	190.8	284.8	118.4	148.1	25.6	-104.9	67.1	-53.5
Danube River Basin District	497.4	3029.3	183.0	883.3	20.5	50.3	46.4	3.3
Pčinj District	272.7	348.2	44.6	162.7	19.0	-74.6	-67.1	-53.6
Toplica District	363.2	611.0	83.6	147.8	27.3	-13.0	10.9	-16.1

Source: Processed by the Author on the basis of the data of the Republic Statistical Office, Belgrade

In Serbia, according to the data for 2015 (Table 2), the degree of the marketability[13] of beef was 16.4%, pigmeat 15.6%, sheep meat 27.0% and poultry meat 16.9%. The Serbia-North Region recorded a deficit in the market production of beef of -25.0% and of sheep meat -81.9%, whereas there was a surplus of the market production of pigmeat of 9.6% and poultry meat of 15.3%. In the Serbia-South Region, a market surplus of all meats was recorded (beef 37.5%, pigmeat 20.9%, sheep meat 54.6% and poultry meat 18.5%).

In Belgrade District, a deficit of all meats was recorded, namely beef -378.7%, pigmeat -221.3%, sheep meat -938.1% and poultry meat 538.3%. In the districts of Vojvodina

13 (production surplus)/total production)*100

Region, there is a deficit of sheep meat in the three Bačka districts (Western Bačka -68.0%, Southern Bačka -19.0% and Northern Bačka -20.0%) of on average 24.3% and poultry meat in the two districts (Middle Banat -23.3% and Srem -9.1%). The other districts of Vojvodina Region have a surplus of beef, pigmeat, sheep meat and poultry meat from 8.8% to 79.3%.

The high level of the marketability of the production of beef in AP of Vojvodina is a result of the low consumption of beef in the nutrition of the population. Traditionally, the population of the AP of Vojvodina predominantly consumes pigmeat and poultry meat in its nutrition. Because of that, the production of poultry meat is traditionally subsistent. Favorable conditions for breeding pigs have as a consequence the volume of production that, even apart from the pronounced presence of pigmeat in the population's nutrition, enables the production of pigmeat to have a high marketability level (Lakić, Stevanović, 2003).

The average marketability of the production of meat in the Region of Šumadija and Western Serbia ranges from 30.6% for pigmeat to 66.4% for sheep meat. Yet, the three districts of the Region of Šumadija and Western Serbia (Zlatibor, Moravica and Raška) have a deficit of the market production of pigmeat and poultry meat, whereas the other fields have a surplus of the market production of all meats.

In the Region of Southern and Eastern Serbia, there is a deficit of poultry meat of -14.0%, whereas the other meats record a surplus of market production from 3.9% for pigmeat to 32.1% for beef. Also, in all the districts of this region, there is a surplus of beef. The two districts of this region (Jablanica and Pčinja Districts) have a deficit of the three meats (pigmeat, sheep meat and poultry meat), and the three districts have a deficit of the two meats (pigmeat and poultry meat).

According to the simple correlation coefficients, the production of pigmeat (r=0.854) has, to the greatest extent, an influence on the total meat production. It is followed by the production of sheep meat (r=0.587) and poultry meat (r=0.571), whereas the smallest influence is that of beef production (r=0.179).

Cluster Analysis of Meat Production in Serbia

The ranking of the districts in Serbia according to the production of beef, pigmeat, sheep meat and poultry meat was done by calculating the I-distance values for the three groups of the features (production, the capacities, and the achieved level of development).

Table 3. The ranks of the districts according to the production of beef, pigmeat, sheep meat and poultry meat in Serbia, according to the I-distance

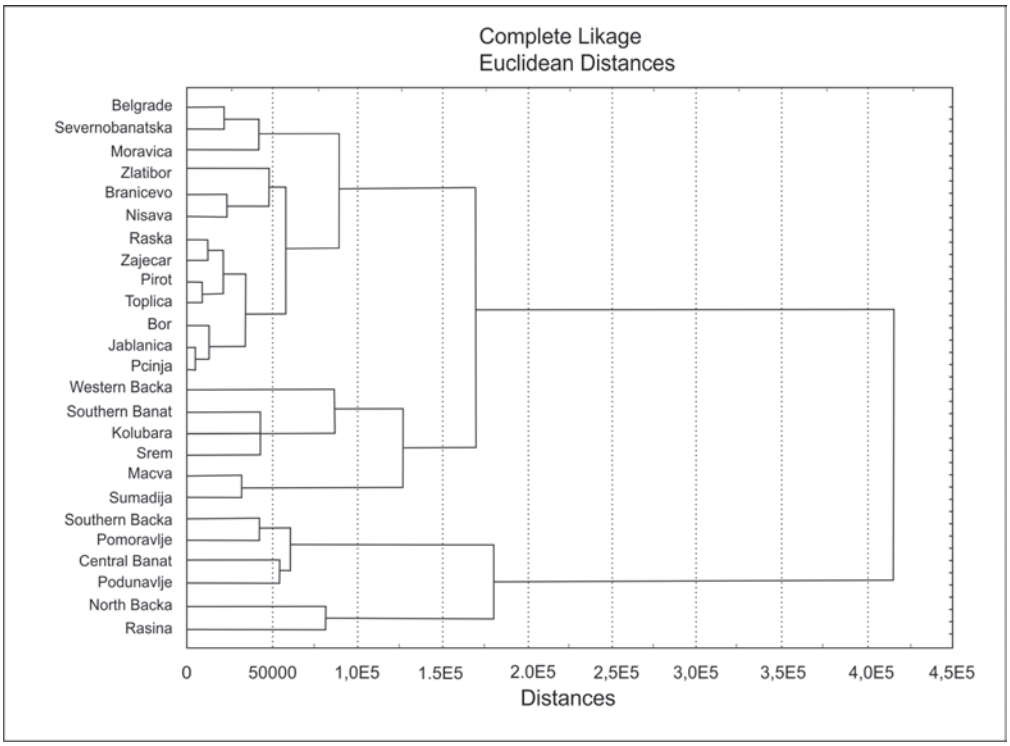
Districts	Features of production		Features of the capacities		Features of the achieved level of development	
	I-distance	Rank	I-distance	Rank	I-distance	Rank
Northern Bačka	66.49	1	2.72	22	15.43	4
Kolubara	41.70	2	7.41	11	21.49	7
Mačva	37.65	3	20.09	5	20.17	10
Middle Banat	37.05	4	38.01	1	21.74	6
Rasina	35.44	5	9.39	9	17.24	16
Moravica	34.26	6	20.03	6	21.00	9
Danube River Basin	34.02	7	2.96	21	10.65	17
Morava River Basin	32.35	8	13.27	8	11.74	15
Srem	31.38	9	3.05	19	14.04	5
Western Bačka	31.30	10	2.07	25	23.59	3
Šumadija	31.07	11	13.88	7	18.44	14
Raška	30.65	12	21.31	4	18.29	23
Southern Bačka	30.07	13	8.80	10	21.41	8
Braničevo	30.03	14	22.77	3	19.44	12
Northern Banat	28.13	15	6.57	12	24.37	2
Zlatibor	27.62	16	24.26	2	20.02	11
Southern Banat	27.28	17	6.24	13	19.29	13
Zaječar	25.23	18	5.17	16	11.26	24
Nišava	25.13	19	5.32	15	21.98	21
Toplica	23.12	20	4.47	17	15.37	18
Jablanica	21.48	21	2.23	24	13.06	22
Pčinj	18.52	22	5.45	14	15.27	19
Pirot	18.39	23	3.56	18	22.96	25
Bor	18.08	24	2.66	23	14.15	20
Belgrade	0.05	25	3.03	20	33.81	1

Source: The calculation done by the Author on the basis of the data obtained from the RSO, Belgrade.

The production of beef, pigmeat, sheep meat and poultry meat is present in all of the 25 Serbian districts. However, the districts significantly differ from one another according to the features of meat production, the capacities and the achieved level of development. So, according to the features of meat production, the districts that belong to the 1-5 Rank, according to the features of the capacities belong to the Ranks from 1 to 22, and according to the features of the achieved level of development to the Ranks from 4 to 16 (Table 3). The stated indicates that the production of beef, pigmeat, sheep meat and poultry meat is not directly related to the features of the capacities and the achieved level of development.

With the exception of Belgrade District, as the most developed in Serbia, the other districts that are ranked the lowest with respect to the feature of meat production are also ranked low with respect to the feature of the capacities (Ranks 14-23) and the achieved level of development (Ranks 18-25).

Figure 2. The dendrogram of the production of beef, pigmeat, sheep meat and poultry meat as per districts in Serbia



Source: Author's Research.

In the dendrogram (Figure 2), the four clusters of the districts of the production of beef, pigmeat, sheep meat and poultry meat in Serbia are identified. The first cluster is the most numerous and encompasses 13 districts, the second cluster–six districts, the third–four districts and the fourth–two districts.

The first cluster consists of two sub-clusters. The first sub-cluster encompasses three districts: two from within the Serbia-North Region and one from the Serbia-South Region. According to the features of meat production, the districts of this cluster belong to the Ranks 6, 15 and 25; according to the features of the capacities, they belong to the Ranks 6, 12 and 20, whereas according to the features of the achieved level of development, they fall within Serbia's more developed areas (Belgrade District–Rank 1, Northern Banat–Rank 2, and Moravica–Rank 9). The second sub-cluster encompasses the 10 districts of the Serbia-South Region, of which only two belong to Šumadija and Western Serbia Region, 8 to Southern and Eastern Serbia Region. According to the features of production, the districts of Šumadija and Western Serbia Region belong to Ranks 12 (Raška District) and 16 (Zlatibor District), according to the features of the capacities–to Clusters 4 and 2, and according to the features of the achieved level of development–to Ranks 23 and 11. The districts that belong to Southern and Eastern

Serbia Region belong to Ranks 18-24 according to the features of production, to Ranks 14-23 according to the features of the capacities, and to Ranks 18-25 according to the achieved level of development. Braničevo District is the exception–according to the above-stated three groups of features, this district belongs to Ranks 14, 3, and 12. The fields of this sub-cluster belong to the Serbian highland areas, rich in the capacities for meat production, but of extensive production, which also has a low degree of development as a consequence.

The second cluster consists of six districts: three from Vojvodina Region and three from Šumadija and Western Serbia Region. According to the features of production, Kolubara and Mačva Districts belong to a high rank (2 and 3), according to the capacities–to Ranks 11 and 5, and according to the features of the achieved level of development–to Ranks 7 and 10. Srem and Western Bačka Districts belong to the most developed areas of this cluster (Ranks 5 and 3), but they rank low according to the features of the capacities (Ranks 19 and 25). The stated indicates that intensive meat production is performed in these districts. According to the features of production, Šumadija and Southern Banat Districts belong to Ranks 11 and 17, according to the features of the capacities–to Ranks 7 and 13, and according to the features of the achieved level of development–to Ranks 14 and 13.

The third cluster encompasses four districts: two from Vojvodina Region (Southern Bačka and Middle Banat Districts) and one district from Šumadija and Western Serbia Region (Morava River Basin District) and one from Southern and Eastern Serbia Region (Danube River Basin District). According to the features of production, the districts of Vojvodina Region belong to Ranks 4 and 13, according to the features of the capacities–to Ranks 1 and 10, and according to the features of the achieved level of development–to Ranks 6 and 8. According to the features of production, the districts of Serbia-South Region belong to Ranks 7 and 8, according to the features of the capacities–to Ranks 21 and 8, and according to the features of the achieved level of development–to Ranks 17 and 15.

The fourth cluster only encompasses two districts: one from Vojvodina Region (Northern Bačka), and one from Šumadija and Western Serbia Region (Rasina District). According to the observed groups of features, Northern Bačka District belongs to Ranks 1, 22 and 4, and Rasina District belongs to Ranks 5, 9 and 16. Northern Bačka District is characterized by the intensive production of beef, pigmeat and poultry meat.

Conclusion

Through meat production, crop raising inputs are also valorized into animal husbandry as a higher stage of finalization. The value of meat production is a result of the multiplied value of investment in animal husbandry. The growth of the productivity of meat production represents a broader synthetic factor, whose degree of influence is determined by all the factors that are related to the development of cattle breeding and represent the factors of beef production.

Therefore, cattle breeding may well be expected to have a greater influence on the development of agriculture. Having in view the structure of meat production in Serbia (beef 20%, pigmeat 60%, sheep meat 5% and poultry meat 15%), the production of pigmeat is the only one that can be expected to have an influence on the development of agriculture as a field. The number of pigs in the observed period, however, was significantly reduced, which reflected on the stagnation of pigmeat production.

Qualitatively observed, the tendencies in the volume of meat production as per kinds of meat are negative in the production of beef, pigmeat and poultry meat, whereas they are only positive in the production of sheep meat. The stated indicates that there is still a low level of the living standard of the Serbian population, which negatively reflects on the qualitative changes in the structure of meat production.

By the analysis of meat production as per kinds of meat, the level of achieved economic development and the share of agriculture in the economic structure, no fact was established across the Serbian districts that there is a high interdependence between meat production and the achieved level of economic development. However, when the farms on which meat production represents the dominant or the only one part of the source of income, as well as the districts in which this type of production is present more than the other types, are concerned, meat production has a great influence on the creation of agricultural revenue, i.e. the GDP of the economy as a whole.

The accelerated economic development of a country, an increase in real salaries, the advancement of agricultural production, an increase in demand for livestock products, as well as the export of livestock products, enable the creation of social-economic and institutional conditions for a faster and more intensive development of animal husbandry. The application of contemporary technology has increasingly been assuming ever-greater proportions in animal husbandry, which is increasingly turning it into industrialized production. That has an influence on the transformation of cattle breeding into an intensive and the most significant branch of agricultural production.

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Conflict of interests

The authors declare no conflict of interest.

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USING TOTAL WATER FOOTPRINT OF NATIONAL CONSUMPTION AS SUSTAINABLE DEVELOPMENT INDICATOR – A CRITICAL REVIEW

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ABSTRACT

In highly competitive and modern economies, water represents a determinant productive resource and using the *water footprint* (WF) as a possible indicator in assessing sustainable development is integrated in the overall framework of macroeconomic efficiency analysis. The main aim of this paper is to argue that water footprint could represent a proper indicator in analyzing the sustainable economic development. In this context the territorial distribution of water footprint across the 28 EU countries is analyzed in order to substantiate decisions and achieve sustainable economic development forecasts and strategies at European level. The results have led to the conclusion that, overall, the total water footprint of national consumption in the 28 EU Member States has a very low degree of concentration, therefore, tends towards uniformity. With regard to the three types of water footprint, the main characteristic outcome of the research is the low degree of concentration for gray and green water footprint, while blue water footprint proves a moderate degree of concentration.

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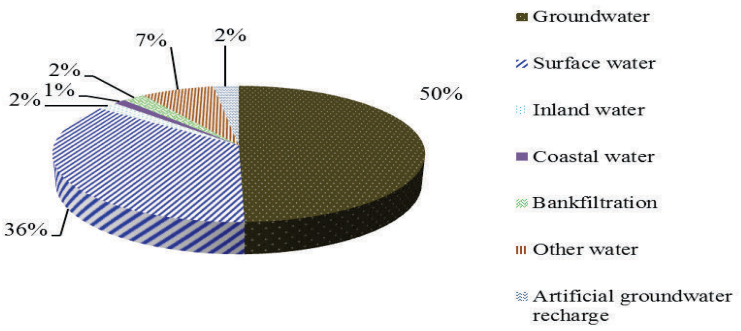
Introduction

The human being, as a beneficiary of the environment, provokes and generates malfunctions which in time have had a significant impact on the economic and human development. Meeting the growing needs of large human communities, consuming environmental services and territorial resources, have led to less favorable environmental effects. Water represents an essential component of the environment, with a complex use (Galli et al., 2012; Gallopin and Rijsberman, 2000; Hoekstra and Mekonnen, 2012). Monitoring the quality and quantity of water is very important in preventing several problems related to the deficit or the loss manifested in various sectors of the economic activity (Kaplowitz and Witter, 2008).

Moreover, water denotes a limited economic resource that directly and irremediably affects the level of competitiveness of the European economy. The intensity of climate change, and especially the frequency of occurrence and manifestation of phenomena such as drought, but also the growing needs of the population, calls for a complex approach to water issues. Water availability and access to sources of supply are major challenges for EU Member States, given the growing share of economic sectors with a high degree of water dependency. The growing need for securing water resources also requires the optimization of consumption and of the geographical distribution of these resources across the EU.

Integrated and efficient water resource management involves a complex process of measures that include, besides water savings, the reuse of waste water, water transfers and desalination. Extending the life cycle of water must in this context be a fundamental objective for achieving sustainable economic development, not only from a sectoral perspective but also as an integrated management tool. At the same time, the transformations of the paradigm of the European economy imposed the necessity of identifying and promoting alternative and reliable sources for ensuring a sustainable water supply in full compliance with the objectives of encouraging the circular economy at European level. Thus, the following figures present sources of drinking water in the European Union (Figure 1) and in its Member States (Figure 2) for the period ranging from 2011 to 2013, according to the European Commission (2016).

Figure 1: Sources of drinking water in the EU (2011 to 2013)

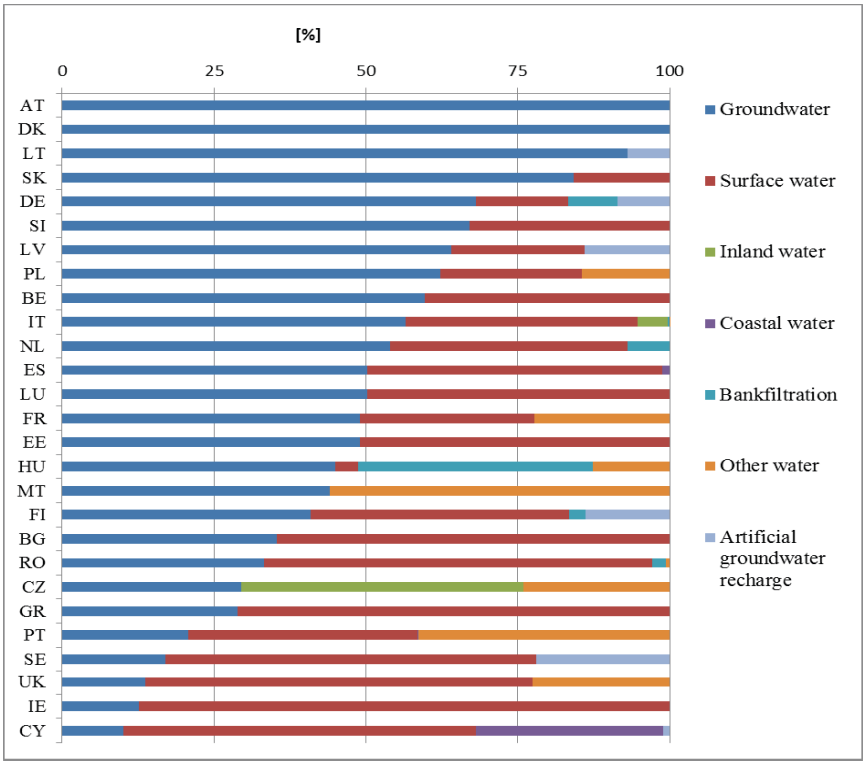


Source: European Commission (2016)

Figure 1 shows that drinking water at EU level is ensured from a wide range of supply sources in which groundwater provides about half of the required amount, while surface water cover only 36% of the necessary drinking water.

This distribution of supply sources requires the promotion and application of a dynamic water management, from the perspective of security of supply and diversity of sources. However, if we consider the distribution of sources for drinking water in the Member States for the same period (Figure 2), one can notice a non-uniform spread of drinking water sources. Thus, some countries such as Austria and Germany secure their needs from the exploitation of underground water resources, while countries such as Romania and Bulgaria through a mix of exploitation composed both from surface and underground sources.

Figure 2: Sources of drinking water in EU Member States (2011 to 2013)



Source: European Commission (2016)

The evolution of water importance and usage in economy has transformed this resource in a potential indicator for understanding sustainable development. In this context, the need for developing a representative indicator has imposed water as a significant candidate in achieveing this goal. Also, given the great importance of water resources in the economy and the multiple roles they play in the everyday life of both people and companies, understanding and promoting an indicator such as *water footprint* as an

instrument in sustainable development analysis is more than opportune. Thus, various researches regarding national water footprint can be identified for several EU Member States, among which the study of Varela-Ortega et al. (2009) analyzing this indicator in Spain, of Sonnenberg, Chapagain, Geiger, and August (2009) for Germany, van Oel, Mekonnen, and Hoekstra (2009) in the case of Netherlands and Sima and Gheorghe (2015) in the case of Romania.

Water footprint represents the indicator that highlights the quantity of water consumed by people in order to produce goods and services, under the impact of direct factors of consumption such as: climatic conditions, agricultural practice, consumption volume of Gross National Income and the consumption model specific to each country (Hoekstra and Chapagain, 2007). As emphasized by available literature (Vanham and Bidoglio, 2013), despite the fact that the water footprint is presented as one aggregate number, it represents a multidimensional indicator of water usage, by combining different types of water consumption and highlighting pollution as a function of space and time.

Furthermore, the water footprint has been analyzed as possible sustainable development indicator in several studies (Lamastra, Suciu, Novelli, and Trevisan, 2014; Varela-Ortega et al., 2009) which may represent important steps in understanding the role and influence of this indicator in shaping the environmental economic behavior.

In adjacent connection with the phenomenon of sustainable development at global level, world organizations have put forward the quantification of the water footprint. The concept of *water footprint*, closely linked to *virtual water* is used in analogy with the *ecological footprint* (Ridoutt and Pfister, 2013; Zhao, Chen, and Yang, 2009).

In this context, the purpose of this research is to analyze the territorial distribution of water footprint across the 28 EU countries in order to substantiate decisions and achieve sustainable economic development forecasts and strategies at European level (Vanham and Bidoglio, 2013). The analysis of territorial distribution was conducted both by measuring the degree of territorial concentration of the water footprint on the 28 EU countries, by graphical and numerical methods, and also by cluster grouping. At the same time, the study was developed taking into consideration the three fundamental components of water footprint: green, blue and gray water footprint of national consumption per capita for the 28 EU countries.

The EU countries are targeting water consumption both in relation to national requirements and to certain consumption related to outsourcing process. Thus, there are countries which, involved in the outsourcing process, considered that the products they import are in direct interdependence with the process of water exhaustion or pollution for the countries that produce them.

The current study is structured into five sections as follows: a brief introduction on the importance of the analysis of territorial distribution of water footprint across the 28 EU countries; the second section includes the methodology and datasets used for research; the third section contains the results of the analysis of the territorial footprint

distribution in the 28 European Union's Member States as a result of the concentration indicators, the construction of the concentration curves and the grouping of the EU member states into clusters. The final section is summarizing the results of the analysis with proposals and visions for future research.

Research methodology

The basis of the study consisted of the series of statistical data on water footprint of national consumption per capita, (m^3/yr/cap) available in Mekonnen and Hoekstra (2011a, 2011b), synthesized from the time range 1996-2005 and structured as:

$$X = \left\{ x_{i,j} \right\}_{i=\overline{1,n},\, j=\overline{1,m}} \tag{1}$$

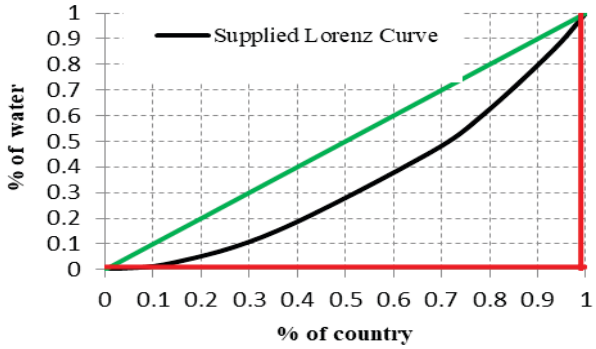
In (1), n=28 represents the EU-28 Member States, and m=4 stands for the three types of water under analysis (green, blue and gray) and total water.

Taking into account the method of calculating the water footprint, the study envisaged the application of methods by which to examine and measure the distribution of the water footprint of national consumption per capita. Thus, the assessment of the concentration of water footprint of the national consumption per capita (m^3/yr/cap) shown by major consumption category and by internal and external component in the EU countries is highlighted by applying both graphical procedures (concentration curve) and numerical procedures (Kaplowitz and Witter (2008) Zaiontz (2017) and (Wessa, 2018)

The graphical procedure used in the analysis of territorial concentration of the water footprint of national consumption per capita shown by major consumption category and by internal and external component is represented by the concentration curve. Depending on the method of determining the Gini Coefficient, as an expression of the level of concentration, the concentration curve of the water footprint of national consumption per capita was completed in two variants. The first variant reflects 6 variation ranges in which the EU countries have grouped, as a result of applying the trapezoid method, and the second is in relation to all EU countries (Lorenz curve).

The degree of concentration is represented by the deviation of the concentration curve (Figure 3) from the diagonal of the square, specifically by the size of the concentration surface. The larger the concentration area, hence the disparity between countries in terms of the water footprint of national consumption per capita is more accentuated, more pronounced the concentration is.

Figure 3: The theoretical curve of concentration of water footprint by country



Source: authors` own computation based on Mekonnen and Hoekstra (2011a, 2011b)

The main numerical indicator used for water footprint analysis of national consumption per capita is Gini Coefficient (Săvoiu, Crăciuneanu, & Țaicu, 2010) given by (2):

$$G = \sqrt{\sum_{i=1}^{n} g_i^2}, \quad g_i = \frac{x_i}{\sum_{i=1}^{n} x_i}, \quad G \in \left[\sqrt{\frac{1}{n}}, 1\right] \tag{2}$$

In (2) xi designates water footprint analysis of national consumption per capita at country level and gi represents the water footprint of national consumption per capita corresponding to that country. In this case $n = 28$, $i = \overline{1,28}$.

Additionally, for analyzing the level of concentration, the following indicators were used: Entropy, Maximum Entropy, Normalized Entropy, Herfindahl, Normalized Herfindahl, Gini Coefficient, and Concentration Coefficient.

To highlight the groups of Member States in which the concentration phenomenon identified by the application of the presented methods appears, the Hierarchical Cluster methodology was used, starting from the data series (1) to which the following transformation was applied (Mooi and Sarstedt, 2011):

$$Y = \{y_{ij}\}_{i=\overline{1,n}, j=\overline{1,m}}, \; y_j = \frac{x_j - \bar{x}_j}{\sigma_j}, i = \overline{1,28}, j = \overline{1,4} \tag{3}$$

Subsequently, in order to generate the Proximity Matrix, the Euclidian distance was used, while for determining the distance between clusters the Average Linkage method was employed.

For testing the statistical significance of the mean values of the variables used for generating the clusters, the Welch's Test and F test were employed (Keselman, Othman, Wilcox, and Fradette, 2004).

The results indicate the location of each country at European level and the role it has in relation to the other countries regarding the changes over time concerning the water footprint of national consumption per capita. This aspect envisages the development and implementation of policies and strategies aimed at sustainable economic development for the European area.

Results and discussion

Since the water footprint refers to the amount needed to support the population of EU countries, the study started with the identification of the level of concentration of the total water footprint of national consumption per capita for the EU28 countries.

At aggregate level, the direct factors of consumption that determine the water footprint of national consumption per capita (volume of consumption related to Gross National Income, consumption pattern, climatic conditions, agricultural practice) have fluctuated through compensation, hence the 28 countries, as a whole, present a fairly low concentration.

The reduced concentration of 12.68% of the total water footprint of national consumption per capita determined at the cumulative level of EU countries is evidenced both by the calculation of the concentration indicators (Table 1) and by the graphic representation as a result of the application of the trapezoid method.

The Entropy indicator with a value of 3.307, close to the value of Maximum Entropy of 3.33 and Normalized Entropy with a high value of 0.9925 pointing to the upper limit 1, indicates a low concentration of total water footprint of national consumption per EU country. This statement is also confirmed by the results of the indicators Herfindahl (0.0375) and Normalized Herfindahl (0.0019), since they tend towards 0.0357, respectively 0.

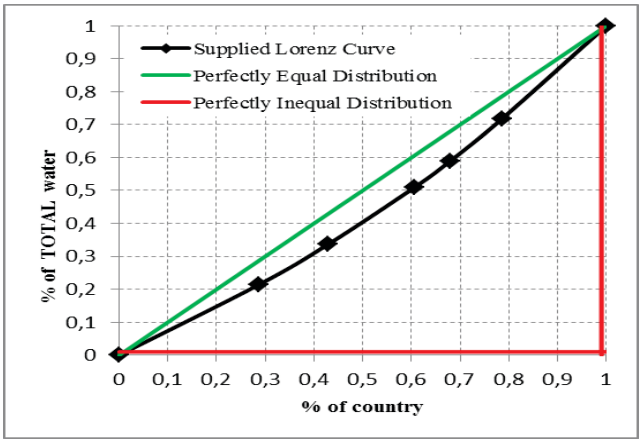
Table 1: Concentration indicators for total water footprint of national consumption per capita

Concentration indicators	Degree of concentration
Entropy	3.3073
Maximum Entropy	3.3322
Normalized Entropy	0.9925
Herfindahl	0.0375
Normalized Herfindahl	0.0019
Gini Coefficient	0.1268
Concentration Coefficient	0.1315

Source: authors` own computations based on Mekonnen and Hoekstra (2011a, 2011b)

The concentration curve of EU countries, distributed into groups by total water footprint of national consumption per capita (Figure 4), is rather close to the diagonal of the square, confirming the low concentration of EU countries regarding the water footprint of national consumption per capita.

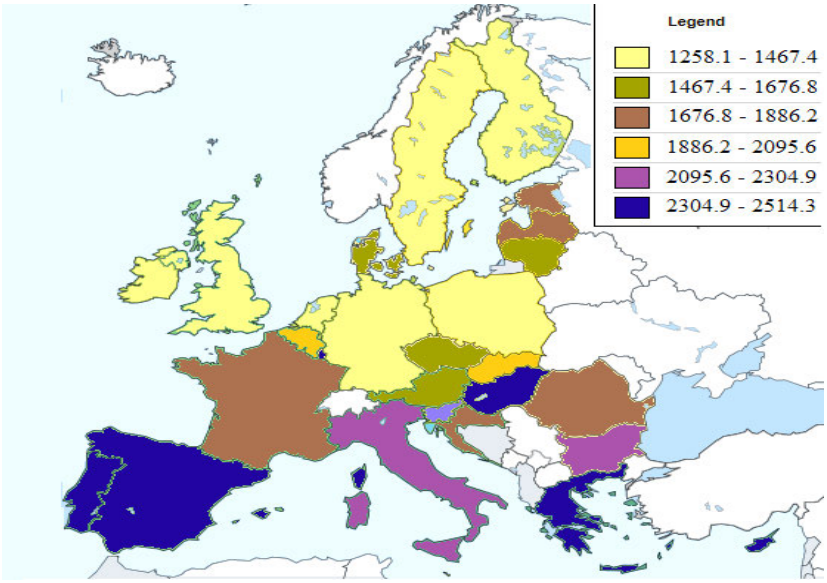
Figure 4: Concentration curve for total water footprint of national consumption per capita



Source: authors` own computations based on Mekonnen and Hoekstra (2011a, 2011b)

In the Gini form, applying the trapezoid method led to the division of EU countries into 6 groups regarding water footprint of national consumption per capita (Figure 5).

Figure 5: Distribution of EU countries by groups of total water footprint of national consumption per capita



Source: authors` own design on Mekonnen and Hoekstra (2011a, 2011b)

In national governmental plans, EU countries have been targeting water consumption to be set both in relation to national requirements and in relation to that consumption leveling the outsourcing process. Water dependence and the results of the algorithm for calculating the trapezoids have led to the conclusion that the UK, Ireland, Slovakia, Poland, Finland, Germany, Sweden, and the Netherlands have the lowest consumption (between 1,258.1 and 1,467.43 m^3/yr/cap) as it was shown in Mekonnen and Hoekstra (2011a, 2011b). They account for 23.32% of all countries that account for 28.57% of the total water footprint of national consumption per capita.

If we also include Lithuania, Austria, Denmark and the Czech Republic, members of the second group with a slightly higher consumption, then 33.62% of all countries will account for 42.86% of the total water footprint of national consumption per capita. With more water consumed than previous groups, another 5 countries (Croatia, Romania, Estonia, France and Latvia) are added to the 12 countries previously mentioned, so that more than half of all countries (51.03%) make up 60.71% of the total water footprint of national consumption per capita. At the level of the fourth group, the 17 countries together with Belgium and Slovenia will represent 58.82% of their total, accounting for 67.86% of the total water footprint of national consumption per capita.

The fifth group indicates a distribution of 78.57% of the total water footprint of national consumption per capita which belongs to 71.78% of the total EU countries (Malta, Bulgaria and Italy were added to the 19 countries). The countries of the last group, Greece, Hungary, Cyprus, Spain, Portugal and Luxembourg are the largest consumers of water (consumption between 2,304.93-2,514.30 m^3/yr/cap), as main consumers of agricultural products, especially of meat. This complements the distribution of the water footprint of national consumption per capita across all European Union's countries.

For a clearer picture of the place occupied by each country in distributing the water footprint of national consumption per capita at European level, completing the study with a more detailed analysis of the territorial distribution of the three types of water – green, blue and gray – proved extremely useful.

Table 2: Concentration indicators for total water footprint of national consumption per capita for the three types of water

Concentration indicators	Entropy		Herfindahl		Gini	
	Indicator	Normalized Entropy	Indicator	Normalized Herfindahl	Gini Coefficient	Concentration Coefficient
Green_Total	3.306	0.992	0.037	0.002	0.131	0.136
Blue_Total	3.134	0.940	0.053	0.018	0.340	0.353
Gray_Total	3.303	0.991	0.038	0.002	0.135	0.139

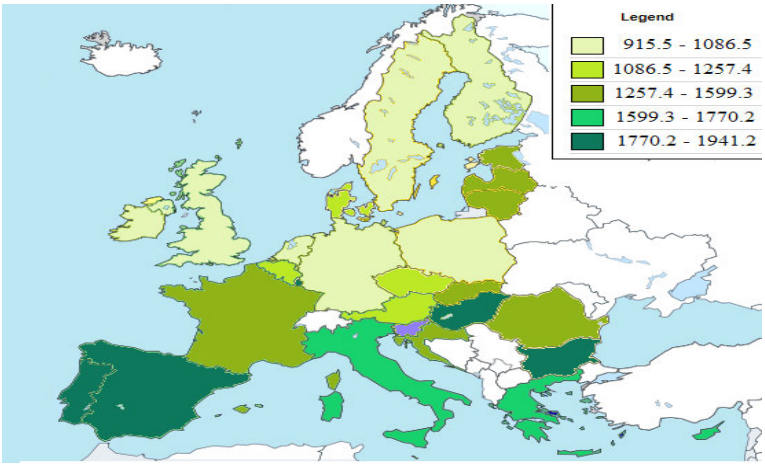
Source: authors` own computation based on Mekonnen and Hoekstra (2011a, 2011b)

In terms of total **green water footprint** of national consumption per capita for EU countries, determining the degree of territorial concentration of countries presents a particular feature. Regarding the amount of rainwater consumed, with a direct impact

on agricultural products, the data recorded for each country led to a concentration of the lower values of the total green water footprint of national consumption per capita, ranging from 915.5 to 1,428.36 m^3/yr/cap in 19 European countries. (Mekonnen and Hoekstra (2011a, 2011b)

Also, as it can be remarked from (Mekonnen and Hoekstra (2011a, 2011b), after a significant gap of 297 m^3/yr/cap, a noteworthy total water footprint of national consumption per capita will be recorded in only 9 countries: Greece, Malta, Cyprus, Italy (1,599.30-1,770.24 m^3/yr/cap), Spain, Bulgaria, Portugal, Hungary, Luxembourg (1,770.24-1,941.17 m^3/yr/cap) Mekonnen and Hoekstra (2011a, 2011b). These nine countries, differing from one country to another, have climate and landscapes that are not very favorable, show a high consumption of agricultural products (especially meat, a large agricultural consumer of water), and have farming practices that do not offer the possibility of important water savings.

Figure 6: Distribution of EU countries by groups according to the total green water footprint of national consumption per capita

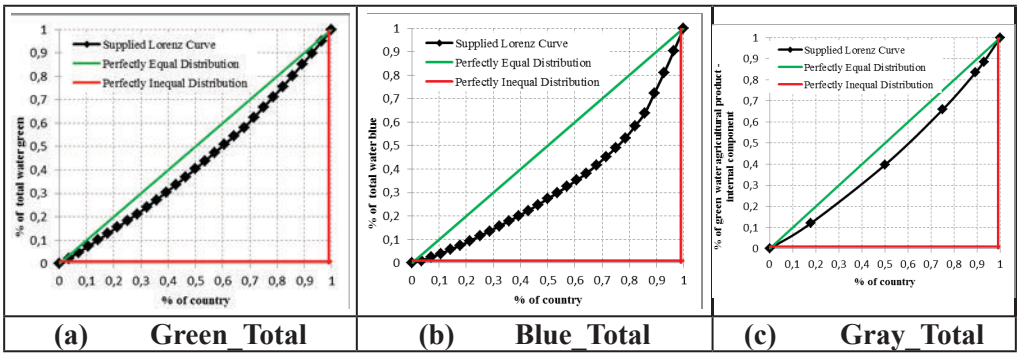


Source: authors` own design based on Mekonnen and Hoekstra (2011a, 2011b)

However, across all EU countries, as shown in Figure 6, the particularity of the high level of the total green water footprint of national consumption per capita of the 9 countries did not greatly affect the degree of territorial concentration. The high value of the Entropy indicator, close to Maximum Entropy, and the one of Normalized Entropy, which tends to the upper limit of value 1 (Table 2), show low concentration of the EU countries regarding total green water footprint of national consumption per capita. This concentration tendency is also confirmed by the values of the other concentration indicators that point towards $\frac{1}{n} = 0.0357$ or towards 0.

The Lorenz concentration curve of EU countries by total green water footprint of national consumption per capita (Figure 7(a)) also indicates a fairly uniform territorial distribution of the countries, being very close to the diagonal of the square.

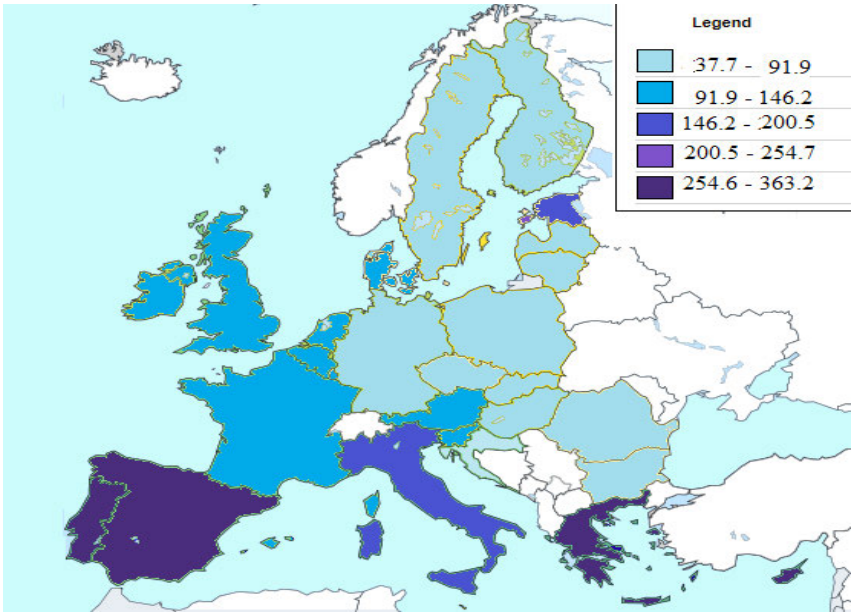
Figure 7: Concentration curve for total water footprint of national consumption per capita for the three major categories



Source: authors` own computations based on Mekonnen and Hoekstra (2011a, 2011b)

The particularity of a significant gap is also encountered when analyzing the concentration of countries for the total **blue water footprint** of national consumption per capita.

Figure 8: Distribution of EU countries by groups according to the total blue water footprint of national consumption per capita



Source: authors` own design based on Mekonnen and Hoekstra (2011a, 2011b)

A remark deriving from Figure 8 emphasizes that Spain, Greece, Cyprus and Portugal are four countries with blue water footprint of national consumption per capita with very high values ranging from 321.2 to 363.2 m^3/yr/cap compared to the other 24 countries, being, as already mentioned, large consumers of agricultural products. The gap between the two groups (the group with the 4 countries and the remaining 24 countries) is significant as it was reviled in (Mekonnen and Hoekstra 2011a, 2011b)– 114.5 m^3/yr/cap, given that between the minimum of 37.7 m^3/yr/cap (Croatia) and the maximum of 206.7 m^3/yr/cap (Malta) 24 countries are distributed.

The territorial concentration degree of 34% of the total blue water footprint of national consumption per capita by country at EU level is quite low, but higher than in the case of the total green water footprint of national consumption per capita, which requires special attention to the issues deriving from blue water footprint of national consumption per capita. This is evidenced by the values of the concentration indicators determined in Table 2 that are higher than the ones of total green water footprint of national consumption per capita, although they tend towards the upper limits for Entropy and Normalized Entropy and towards the lower limits for Herfindahl, Normalized Herfindahl, and Gini Coefficient.

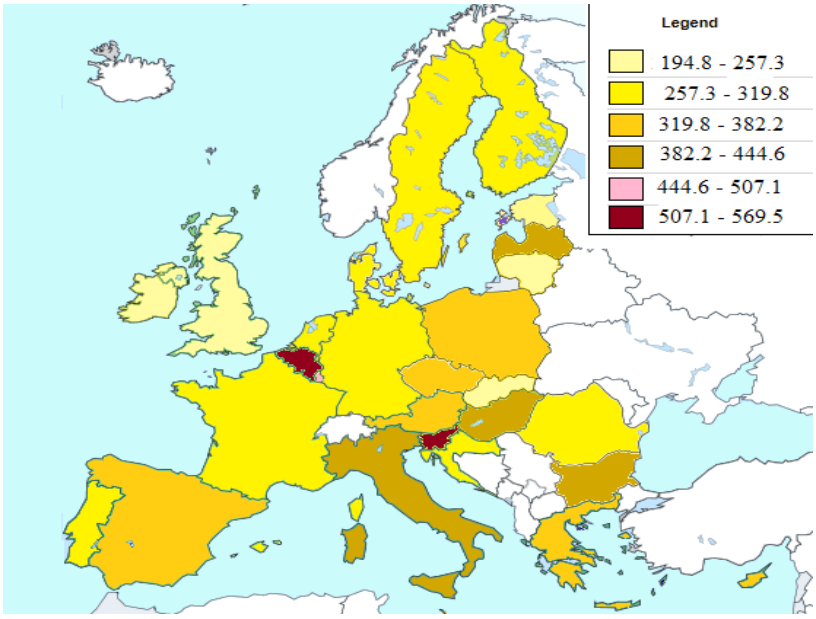
At the same time, the graphical representation (Figure 7(b)), with the traced curve built at a higher distance than the diagonal, reveals a more marked disparity among countries concerning the total blue water footprint of national consumption per capita compared to the total green water footprint of national consumption per capita.

Started form the consideration that water footprint is a major component of the environmental footprint, the gray water footprint (Figure 9) component represents a proper indictor in highlighting the human pressure on the environment. In this context analyzing the gray water footprint as a component in total water footprint of national consumption per capita could be considered justified in revealing the sustainable development. Starting from the main assumption that gray water footprint has the lowest degree of concentration among the analyzed countries; it could be considered as a basic indicator in understanding the economic impact on the environment pressure. Moreover, the analysis shows that the gray water footprint distribution is very close to the uniform one.

Belgium and Slovenia are the countries with the highest total gray water footprint of national consumption per capita as it was measured in (Mekonnen and Hoekstra (2011a, 2011b) ranging from 507.05 to 569.50 m^3/yr/cap, followed by Luxembourg with 469.6 m^3/yr/cap. The succeeding group includes Italy, Hungary, Bulgaria, and Latvia with total gray water footprint of national consumption per capita between 382.16 and 444.61 m^3/yr/cap. The Czech Republic, Malta, Poland, Spain, Cyprus, Greece, and Austria are 7 countries with values between 319.72 and 382.16 m^3/yr/cap. Most countries (Romania, Finland, Netherlands, Germany, Portugal, Croatia, France, Sweden, and Denmark) have a total gray water footprint ranging from 257.27 to 319.72 m^3/yr/cap. The last analyzed group includes the countries with the lowest total gray

water footprint of national consumption per capita extending from 194.83 to 257.27 m^3/yr/cap. (Mekonnen and Hoekstra (2011a, 2011b)

Figure 9: Distribution of EU countries by groups according to the total gray water footprint of national consumption per capita

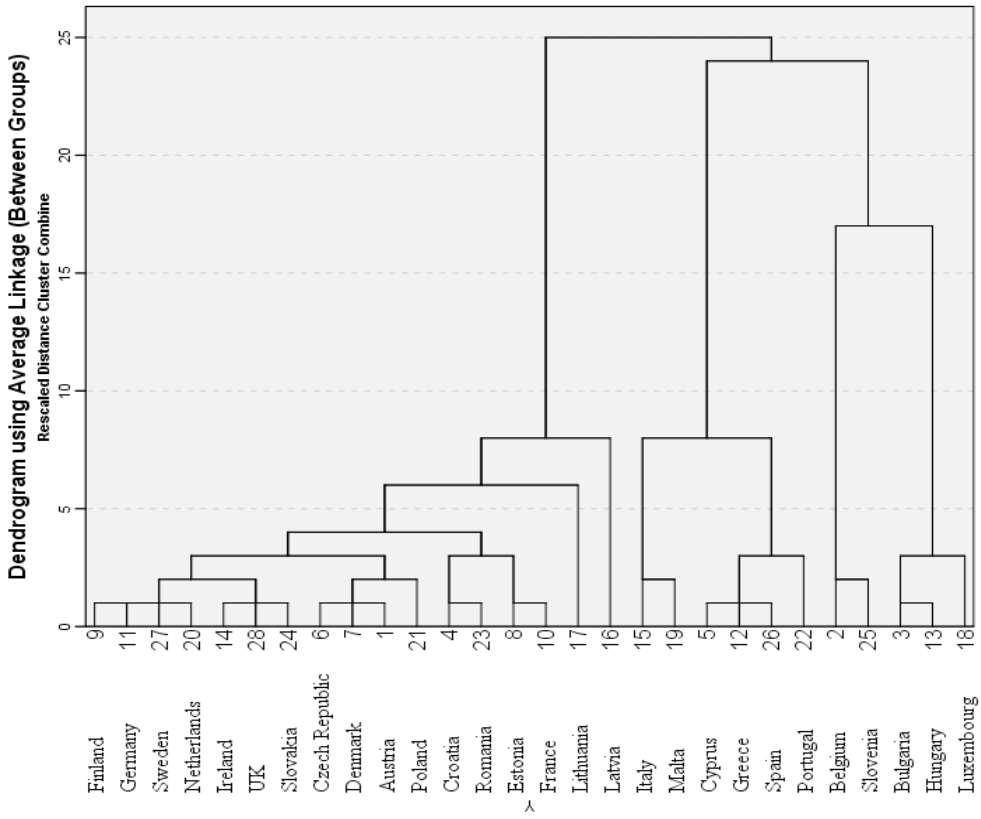


Source: authors` own design based on Mekonnen and Hoekstra (2011a, 2011b)

The concentration curve (Figure 7(c)), traced through the six groups of countries formed, confirms the almost uniform distribution of countries in terms of total gray water footprint of national consumption per capita. By comparing the three graphs of the three types of water footprint, it is noted that the latter has the closest curve to the square's diagonal, highlighting the approximation of the uniform distribution; this tendency is supported by the results of the concentration indicators (Table 2) which are very close to the upper limits of Entropy and Normalized Entropy and the lower limits of Herfindahl, Normalized Herfindahl and Gini Coefficient.

The analysis of the degree of concentration of the total water footprint of national consumption per capita for the 28 EU countries is deepened by grouping them into clusters. Considering the statistical data series, synthesized from 1996-2005, referring to the water footprint of national consumption per capita, on the three types (green, blue and gray), a dendrogram (Figure 10) suggesting several clustering solutions (between 3 and 10 clusters) was constructed.

Figure 10: Dendrogram using Average Linkage method



Source: authors` own design based on Mekonnen and Hoekstra (2011a, 2011b)

Subsequently, the methodology determined the number of clusters; the choice is based on both the significant reduction of Total Sum of Squared Error (Peeples, 2011) and better readability of the results. The applied methodology allowed the formation of four significant clusters synthesized by country in Table 3. These clusters were afterwards used in the analysis of water footprint of national consumption per capita.

Table 3: The structure of clusters determined upon green, blue and gray water footprint of national consumption per capita

Cluster	Countries included in clusters
C1	Austria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Latvia, Lithuania, Netherlands, Poland, Romania, Slovakia, Sweden, UK
C2	Belgium, Slovenia
C3	Bulgaria, Hungary, Luxembourg
C4	Cyprus, Greece, Italy, Malta, Portugal, Spain

Source: authors' own calculation based on Mekonnen and Hoekstra (2011a, 2011b)

Testing the statistical validity of the chosen solution (the formation of the four clusters) involves testing the hypothesis that cluster membership of each analyzed variable is not statistically significant (Table 4).

Table 4: The results of testing the hypothesis regarding cluster membership of the green, blue and gray water footprint of national consumption per capita

Variables	df_1	df_2	Fstat	$F_{0.05;3;24}$	Sig.F
Green	3	24	44.20	3.01	0.0000
Blue	3	24	35.41	3.01	0.0000
Gray	3	24	23.75	3.01	0.0000

Source: authors' own calculation based on Mekonnen and Hoekstra (2011a, 2011b)

The results obtained as an outcome of applying relationship (8) (Table 4) show that the analyzed variables are statistically significant from the point of view of cluster membership because the values of F are higher than the critical value $F_{0.05,3,24}$=3.01. Fulfilling the conditions of statistical significance for the four clusters allows the analysis of the variables green, blue and gray water footprint of national consumption per capita to be further carried out in relation to the mean values determined and presented in Table 5.

Table 5: The values of clusters' center (means) for the variables green, blue, gray water footprint of national consumption per capita

Variables		**C1**	**C2**	**C3**	**C4**
Green	Mean	1155.21	1280.65	1888.90	1730.98
	SD	154.53	91.85	70.14	80.14
	SE	37.48	64.95	40.49	32.72
Blue	Mean	88.56	119.70	83.93	293.18
	SD	30.46	31.82	18.94	74.15
	SE	7.39	22.50	10.93	30.27
Gray	Mean	292.17	549.55	425.47	344.02
	SD	50.31	28.21	38.25	33.79
	SE	12.20	19.95	22.09	13.79

Source: authors' own calculus based on Mekonnen and Hoekstra (2011a, 2011b)

Note: SD – Std. Deviation; SE – Std. Error

The detailed analysis of the results comprised in Table 5 covers all the countries in the clusters, for which the evolution of the three variables green, blue, respectively gray water footprint of national consumption per capita is being studied and compared.

Depending on the mean value at cluster level, corresponding to the three variables taken into analysis, it can be stated that most countries (17 countries) are concentrated in cluster 1 (C1) compared to the other three clusters. The countries in cluster 1 are: Austria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Latvia, Lithuania, Netherlands, Poland, Romania, Slovakia, Sweden, UK. One

main characteristic of this cluster is the oscillation of the mean values of the water footprint of national consumption per capita between 915.50 m^3/yr/cap (UK) and 1,355 m^3/yr/cap (Croatia) for green, between 37.70 m^3/yr/cap (Croatia) and 156.50 m^3/yr/cap (Estonia) for blue and between 194.80 m^3/yr/cap for Lithuania and 406.20 m^3/yr/cap (Latvia) in the case of gray water footprint.

At 95% level of confidence, the lowest mean consumption of water footprint is recorded for blue (88.56 m^3/yr/cap per country), whose interval of the mean ranges between 72.90 m^3/yr/cap per country and 104.32 m^3/yr/cap per country. As in (Mekonnen and Hoekstra (2011a, 2011b), with a value of 203.61 m^3/yr/cap per country more than the blue water footprint is the consumption of gray water footprint of national consumption per capita whose interval of the mean ranges between 266.30 m^3/yr/cap and 318.04 m^3/yr/cap per country. The green water footprint of national consumption per capita is the type of water with the highest mean value of consumption with a minimum of 1,075.75 m^3/yr/cap per country and a maximum of 1,234.66 m^3/yr/cap per country as it was measured in Mekonnen and Hoekstra (2011a, 2011b).

Cluster 2 (C2) shows the distribution of water consumption between two countries: Belgium and Slovenia. Corresponding to these two countries, the mean value of green water footprint of national consumption per capita is 25.44 m^3/yr/cap per country, higher than the one of C1 and lower compared to the other two clusters (C3, C4). At 95% confidence, the interval for mean ranges between 455.38 m^3/yr/cap per country and 2,105.92 m^3/yr/cap per country for this particular variable. For Belgium, a reduced consumption of green water footprint of 1,215.7 m^3/yr/cap was determined, while Slovenia registers a consumption of 129.9 m^3/yr/cap higher than Belgium.

The same situation is also noted in the case of the gray water footprint of national consumption per capita when, compared to Belgium's consumption of 529.6 m^3/yr/cap, Slovenia has a higher consumption by 39.9 m^3/yr/cap under the conditions of calculating a mean consumption of 549.55 m^3/yr/cap, values which are presented in Mekonnen and Hoekstra (2011a, 2011b).

A change between hierarchical positions occupied by the two countries occurs in the case of blue water footprint of national consumption per capita, with a mean consumption of 119.70 m^3/yr/cap per country. For this type of water, Belgium has a higher consumption by 45.0 m^3/yr/cap compared to Slovenia, for which the recorded blue water footprint of national consumption per capita is 97.2 m^3/yr/cap. Furthermore, cluster 3 (C3) consists of three countries: Bulgaria, Hungary and Luxembourg. The mean value of 1,888.9 m^3/yr/cap per country of the green water footprint of national consumption per capita ranges from a minimum of 1,809.20 m^3/yr/cap (Bulgaria) and a maximum of 1,941.20 (Luxembourg), Hungary accounting for a value of 1,916.3 m^3/yr/cap, with a 95% confidence level, data confirmed in Mekonnen and Hoekstra (2011a, 2011b).

Between Bulgaria and Hungary there is a reversal of the hierarchical positions regarding the consumption of the other two types of water. As in (Mekonnen and Hoekstra (2011a, 2011b), the minimum consumption will be recorded for Hungary instead of Bulgaria

(65.7 m^3/yr/cap compared to 82.6 m^3/yr/cap for blue and 401.8 m^3/yr/cap compared to 405.0 m^3/yr/cap for gray).With respect to maximum consumption, the same country, Luxembourg, will have the highest values of 103.5 m^3/yr/cap for blue and 469.6 m^3/yr/cap for gray water footprint, respectively.

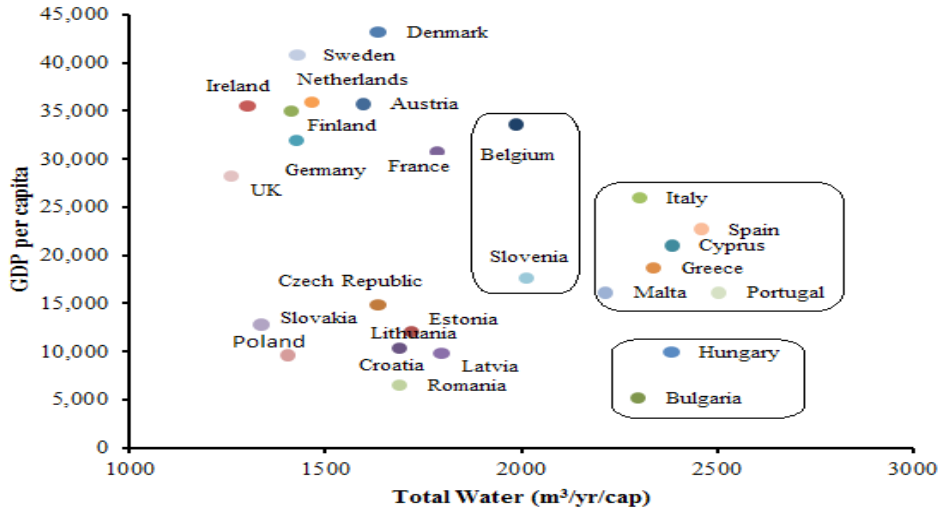
The ranking of the six countries (Cyprus, Greece, Italy, Malta, Portugal, and Spain) in cluster 4 (C4), in relation to the mean values of the water footprint of national consumption per capita, changes from one type of water to another. Thus, for the green water footprint of national consumption per capita, the first place regarding the amount of water consumed is occupied by Portugal with 1,854.2 m^3/yr/cap and the last by Greece with 1,652 m^3/yr/cap (Mekonnen and Hoekstra (2011a, 2011b). Given these limits, fluctuations in water consumption are placed for this cluster and water type around the mean of 1,730.98 m^3/yr/cap per country. In a confidence interval of 1,646.88 m^3/yr/cap per country and 1,815.09 m^3/yr/cap per country (95% confidence), the other four countries are ordered as follows: Spain with 1,802.1 m^3/yr/cap, Italy with 1720.5 m^3/yr/cap, Cyprus with 1682.3 m^3/yr/cap and Malta with 1674.8 m^3/yr/cap as in Mekonnen and Hoekstra (2011a, 2011b).

Blue water footprint of national consumption per capita shows a mean value of consumption of 293.18 m^3/yr/cap per country, for a 95% confidence level, in a confidence interval between 215.37 m^3/yr/cap per country and 371.00 m^3/yr/cap per country. For this type of water, cluster 4 maintains Portugal first with 363.2 m^3/yr/cap, followed by Cyprus with 349.3 m^3/yr/cap, Greece in third place with 326.0 m^3/yr/cap, fourth place for Spain with 321.2 m^3/yr/cap, then Malta with 206.7 m^3/yr/cap, and Italy last with 192.7 m^3/yr/cap. (Mekonnen and Hoekstra (2011a, 2011b).

Regarding the gray water footprint of national consumption per capita, a mean consumption of 344.02 m^3/yr/cap per country was recorded for cluster 4. For this type of water, Portugal takes a minimum consumption of 288.10 m^3/yr/cap (Mekonnen and Hoekstra (2011a, 2011b). In the increasing order of consumption, the ranking of the countries of this cluster is: Malta with 334.3 m^3/yr/cap, Spain with 338.0 m^3/yr/cap, Cyprus with 353.8 m^3/yr/cap, Greece with 360.1 m^3/yr/cap and Italy with 389.8 m^3/yr/cap, having the highest consumption of gray water. (Mekonnen and Hoekstra (2011a, 2011b).

Another aspect of the water footprint analysis of national consumption per capita across the 28 EU Member States highlights that the territorial distribution obtained as a result of clustering is significantly justified by the GDP of each country.

Figure 11: Grouping of countries by total water footprint and GDP per capita



Source: authors` own design based on Mekonnen and Hoekstra (2011a, 2011b)

Taking into account the mean values of the total water footprint of national consumption per capita, a graphical representation (Figure 11) was made in relation to GDP per capita, in order to clearly show their evolution within clusters.

The data included in the analysis determined the concentration of the countries according to the results obtained by the clustering methodology (Table 3) and the graphical representation (Figure 11) into the four clusters presented, which leads to the conclusion that the GDP significantly influences the distribution of the water footprint. The obtained results and the graphical representations reflect the low and moderate concentration of the three types of water footprint of national consumption per country.

Conclusions

The paper presents certain aspects related to the degree of territorial concentration of water footprint of national consumption across the 28 EU Member States, considering the three known components: green, blue and gray water footprint. The analysis of the territorial concentration was completed by applying the trapezoid method and the concentration indicators: Entropy, Maximum Entropy, Normalized Entropy, Herfindahl, Normalized Herfindahl, Gini Coefficient, and Concentration Coefficient, and graphical representation through the Concentration Curve namely the Lorenz Curve. At the same time, this analysis was supplemented by the application of the clustering method for the water footprint of national consumption, in the context of highlighting the impact of GDP on water consumption.

The results have led to the conclusion that, overall, the total water footprint of national consumption in the 28 EU countries has a very low degree of concentration, therefore,

tends towards uniformity. With regard to the three types of water footprint, there is a low level of concentration in the case of gray and green water footprint, while the blue water footprint provides a distribution with a moderate degree of concentration.

Taking into account the results, the composition of each type of water footprint and the direct factors mentioned in the introduction that act upon it, clearly explain that the water footprint distribution places the following six countries as water-consuming: Greece, Hungary, Cyprus, Spain, Portugal, and Luxembourg; the lowest water consumption is recorded in the UK, Ireland, Slovakia, Poland, Finland, Germany, Sweden, Netherlands.

The eight countries presented as low water-consuming hold their position also for green water footprint due to climate conditions and excessive consumption of meat and agricultural products. At the opposite pole Hungary, Bulgaria, Spain, Portugal and Luxembourg are situated, which, according to the ranking of the territorial distribution of the green water footprint, register the largest quantities of water consumed.

Four of the six water-consuming countries (Spain, Greece, Cyprus, and Portugal) find themselves in the distribution of blue water footprint. Depending on the way it is formed, the climate and the landscape of each country, the low water footprint consumption is justified and listed for: Croatia, Lithuania, Poland, Latvia, Hungary, Slovakia, Romania, Finland, Czech Republic, Bulgaria and Germany. Belgium and Slovenia are the countries with high gray water footprint consumption, while Lithuania, Slovakia, Estonia, UK, and Ireland occupy the last places in the hierarchy of countries consuming this type of water.

The results of clustering highlight the same aspects of territorial concentration of water types by country, but the four clusters complete the analysis of the mean values obtained and the link with the GDP, stressing the place and role of the water footprint in the EU as a whole, but also in the economy of each country. These results, employing concentration methods, lead to a hierarchy that emphasizes to a certain extent the level of each Member State, proving useful for the national policy adopted by each country. At the same time, as they represent a firm starting point, the perspectives of analyses of the water footprint distribution can be continued both on the three types of water and on the various categories of activities (agriculture, industry, domestic), while considering the internal and external dimensions.

Conflict of interests

The authors declare no conflict of interest.

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SERBIAN PORK MARKET ANALYSIS

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ABSTRACT

Pig farming is the second most important branch of livestock production according to value of agricultural production, while pork meat is the most widely eaten meat in Serbia. As the one of the characteristics of pig market is cyclicality in the movement of production volumes and prices which can influence on the imbalance in supply and demand and in price fluctuations, the main aim of this paper was to analyse pork market in Serbia. Namely, in order to identify factors that influenced pork supply and demand, and to determine the presence of cyclical oscillations on pork market, pork market in Serbia was analyzed with supply and demand functions and with Cobweb model. The results indicated that factors which influenced on demand for pork were: personal consumption, retail price of pork and beef. On the other hand, on the supply side the most important factor was the price of pork. The results also indicated that in analyzed period in Serbia existed convergent type of Cobweb model.

Introduction

Pig farming is a significant branch of agriculture in Serbia. Namely, according to the share in the total value of agricultural production, pig farming is the second most important branch of livestock production in Serbia, after cattle breeding. Also, from the aspect of production and consumption, pork is the most important category of meat. In the period from 2004 to 2015, pork meat was the major type of meat accounting for 57.6% of total meat production. Also, pork meat is the most widely eaten meat in Serbia with an average annual consumption of 27.5 kg per capita followed by poultry (11 kg per capita per year) beef (8.2 kg per capita per year), sheep and goat meat (2.5 kg per

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capita per year) (FAOSTAT, 2017). The actual consumption of pork in Serbia is probably higher. Namely, pig slaughtering in places other than slaughterhouses (for example, family farms) for own consumption is very widespread. Therefore, data on the number of slaughtered pigs, pork production and consumption are rather underestimated than real data (FAO, EBRD 2007; FAO, 2009).

Pig production in Serbia had a growing trend until the mid-1980s. After that the number of pigs was in constant decline (Popović, Knežević, Štavljanin, 2010). In Serbia, there are about 3.5 million pigs and 355 thousand pig farms. Since 2000, the number of pigs in Serbia have decreased by 30%, while the number of sows has almost halved. In Serbia in the period from 2004 to 2015 the average rate of fall in the number of pigs was 1.2% per year. Also, in the same period the number of sows decreased at an average annual rate of 5.7%. The past period was very unfavourable for pig farmers. Namely, due to frequent cycles of the livestock market, pig farmers made significant losses (Jeremić, Zekić, Matkovski, 2015).

One of the characteristics of pig market is cyclicality in the movement of production volumes and prices. Cyclical movements of production in the agricultural sector are manifested by the imbalance in supply and demand and in price fluctuations, which is the case with the pork market. Therefore, having in mind retrograde tendencies and cyclical movements in pork market the basic objective of the paper is to evaluate the functions of supply and demand of pork in order to identify the factors that in the previous period influenced the supply and demand for pork. On the other hand, the other goal was to determine the presence and type of cyclical movements on pork market in Serbia.

Materials and methods

A demand for a product represents the total amount of products that customers are willing to buy. Demand for pork fluctuates and depends on the many factors (Lâm et al., 2013). Numerous factors (economic, health, cultural, religious, and the like) affect population demand for pork. However, only some of the factors are measurable. In this paper, only quantifiable factors were used and those factors are: price of pork, prices of other types of meat (substitute), data on personal consumption of the population and the number of inhabitants. According to Bielik and Šajbidrova (2009) the demand of population is the most important factor which influence on the amount of the production and on supply. Therefore, the assumption used to evaluate pork demand function is that the domestic population consumption of pork approximates the demand for it.

In this paper, the following demand elasticity coefficients were analyzed: the demand elasticity coefficient in relation to personal consumption (income elasticity of demand), the price elasticity of demand (direct and cross), and the elasticity coefficient of demand in relation to the change in the number of inhabitants.

The function of pork demand is assessed by the method of ordinary least squares in the logarithmic-linear form:

$$\ln D_t = \ln\alpha + \beta_1 \ln P_t + \beta_2 \ln Pc_t + \beta_3 Ppm_t + \beta_4 \ln Pbm_t + \beta_5 \ln Pcm_t + u_t \quad (1)$$

where: D_t - population demand for pork; P_t - population number; Pc_t - real personal consumption[4], Ppm_t - real retail pork price, Pbm_t - real retail beef price; Pcm_t - real retail price of chicken meat; α - constant, β_1, β_2, β_3, β_4, β_5 - parameters of the function, u_t - stochastic variable. The parameters of the function also show certain elasticity coefficients. That is, the parameter next to the population β1 is the elasticity coefficient of demand in relation to the population. The parameter next to personal consumption, β2, represents the coefficient of demand elasticity in relation to personal consumption (income elasticity of demand). The parameter β3, is a direct price elasticity of demand. Parameters with retail prices of beef and chicken meat, β4 and β5, represent the coefficients of cross-elasticity of demand. More precisely, the parameters β4 and β5 show the cross-price elasticity of the demand of the substitutes.

The production and supply of agricultural products are determined by numerous economic and non-economic parameters, and the most important is the price of the product which affects the volume of production (Mičić et. al, 2017). The first pork supply function which was evaluated had the following form (logarithmic-linear form):

$$\ln S_t = \ln\alpha + \beta_1 \ln Ppm_{t-1} + \beta_2 \ln S_{t-1} + \beta_3 T \quad (2)$$

where: S_t - pork supply (kg) ; Ppm_{t-1} - real pork meat price wit one lag (rsd/kg); S_{t-1} - pork supply from the previous period; T - time; α - constant, β_1, β_2, β_3 - parameters of the function.

There are different approaches for analyzing cyclical movements in agricultural production. For the purposes of this paper, the Cobweb model was used. Stephane (2008) consider that Cobweb model assume that amount of product supply in current period depends on the price lever from the last period. According to Lovre (1997), the Cobweb model is a simplified analysis of the cyclical movement in the market of a particular product, based on two variables: the relative price of the product and the amount of production. The simplest form of the Cobweb model consists of two functions, which are the function of supply and demand with the necessary condition for the equity of the quantity of demand with the quantity of supply:

$$D_t = \alpha_0 + \alpha_1 P_t \quad (3)$$

$$S_t = \beta_0 + \beta_1 P_{t-1} \quad (4)$$

$$D_t = S_t = Q_t \quad (5)$$

4 In order to calculate real personal consumption GDP deflator was used. Namely, by using the data on personal consumption at a constant price statistically insignificant results were obtained. On other hand, in order to calculate real prices of pork, beef and chicken meat price of corn is used. Namely, prices of pork, beef and chicken meat was deflated by average purchase prices of corn, as the most important component of fodder.

where: D_t - demand in time t; S_t - supply in time t; Q_t - equilibrium quantity in time t; P_t - price of product in time t; P_{t-1} - price of product in time t-1; $\alpha_0, \alpha_1, \beta_0, \beta_1$ - parameters of the function.

Flexibility of prices and quantity around the equilibrium and the character of oscillations depend on the relationship of parameters β_1/α_1. In linear supply and demand functions the estimated parameters are theoretically correct if $\beta_1>0$ and $\alpha_1<0$. The absolute values of these parameters determine the fluctuations in prices and quantity around the equilibrium, and indicate whether these quantities will converge, diverge, or oscillate in the same direction.

The empirical research of the supply, demand functions and Cobweb model include the time period from 2004 to 2015, and the data are given on an annual basis. The time period covered by the analysis is determined by the availability of data. The price data are shown as real data[5].

Results and discussions

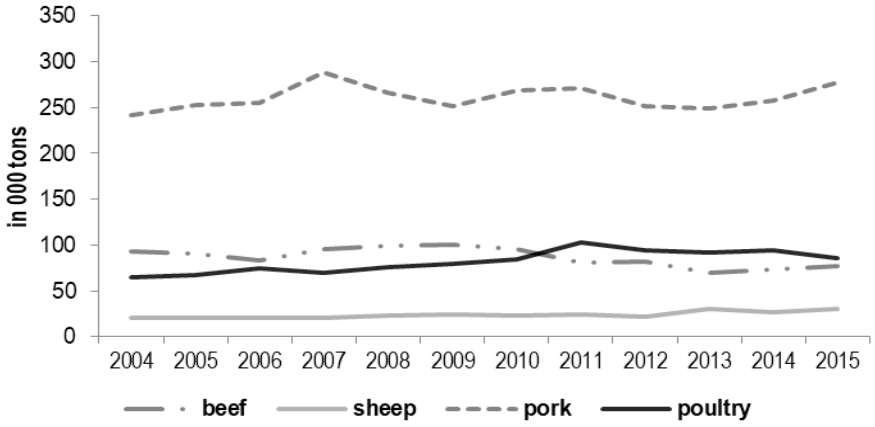
Production and trade performances of pork meat in Serbia

The pork is major type of meat produced in Serbia (Figure 1.). In the period from 2004 to 2015, average production of pork meat was 261 thousand tons, followed by beef, poultry and sheep meat with average production of 87, 82 and 24 thousand tons, receptively. According to Petrović et al. (2013) besides a number of important characteristics of pigs, one of them, which is different from other domestic animals is a considerable amount of meat that can be produced per sow per year (more than 2,000 kg of live weight of fatteners or over 1,600 kg of carcass sides or more than 800 kg of meat).

In the observed period, the total production of pork was growing at a very small average annual rate of 0.34%, and ranged from 240 to 290 thousand tons. The lowest pork meat production was recorded in 2004, when the production of pork reached the level of 242 thousand tons. On the other hand, the maximum production was realised in 2007 (287 tons), after which the pork production was constantly decreasing. According to Mijić, Zekić, Jakšić (2016) those tendencies are more or less in correlation with the movement of the number of livestock units.

5 In the case of demand function and Cobweb model as data sources, the following were used: Statistical Yearbooks of the Republic of Serbia for data on the average annual retail price for pork, beef and chicken meat, personal consumption and the number of inhabitants. On the other hand, in the case of a supply function and Cobweb model, as a sources of data the following were used: Statistical Yearbooks of the Republic of Serbia for data on the average annual retail price of pork; Database of the Statistical Office of the Republic of Serbia for data on the supply of pork and the price of corn.

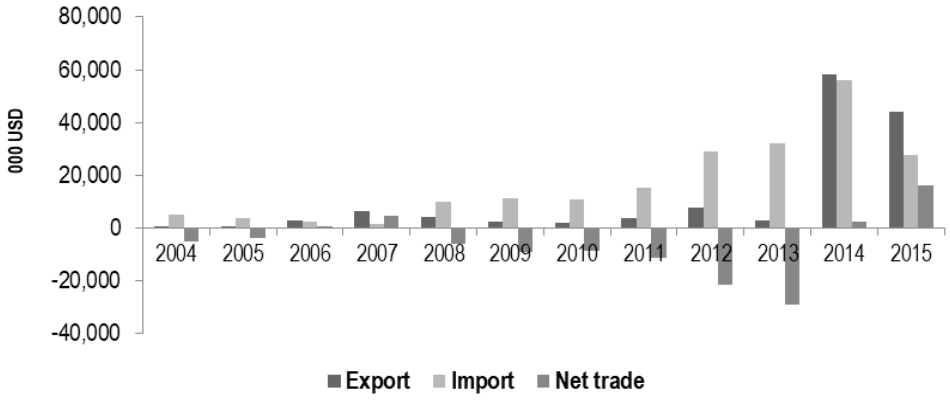
Figure 1. Meat production in Serbia



Source: Statistical Office of the Republic of Serbia, 2017

As the foreign trade flows of pork are concerned, in the analyzed period pork export increased and the largest share of pork export in total export was in 2014 (Figure 2.). The value of export in 2014 in relation to 2004 rose nominally from USD 20.8 thousand to USD 58 million. This growth of pork export is the result of an increase in exports to the Russian Federation. In the same period the import of pork was also constantly increasing, and reached its maximum level in 2014. Until 2014, Serbia had negative pork meat foreign trade balance. Large amounts of a pork import had negative influence on domestic production and on pig farmers. In 2014, when Serbia exported a significant part of domestic production to Russia, in order to meet domestic demand, pork import increased. The most important import market in that year was Spain. Namely, compared to 2013 when the value of pork import was USD 18.1 million, in 2014 pork import from Spain increased to USD 30.2 million.

Figure 2. Pork net trade in Serbia



Source: Statistical Office of the Republic of Serbia, 2017

Foreign trade liberalization influenced by free trade agreements with European Union, CEFTA countries and Russia had effects on foreign trade of Serbian products and its positions on foreign market. According to some previous researches which analyzed liberalization effects and level of comparative advantages in Serbia, results showed that meat and meat products had comparative advantages on international market, but with negative tendencies (Matkovski, Lovre, Zekić, 2017), while on market of Western Balkan countries, meat and meat products had comparative advantages in all countries, except Croatia (Birovljev, Matkovski, Ćetković, 2015). Potential consequences of Serbian foreign integration in future will be international competition, while prices of pigs and pig meat will probably decrease more than cost of inputs. Answer to this situation will be necessity to reduce production costs (first of all cost of food and piglets) which can be achieved through technological improvement, lower variable and fixed costs (Petrović, 2005). Additionally, increasing the competitiveness of Serbian livestock production can be achieved by creating the conditions for the market environment through investment, both in knowledge and in equipment. Therefore, structural and institutional measures, and measures of credit support should be the main instruments for achieving this goal (Petrović et al., 2013).

Pork meat demand function analysis

Based on the empirical analysis of the pork demand function, it is possible to determine the direction and intensity of the relationship between the demand for pork and the factors that affect it. More precisely, the estimated elasticity coefficients indicate the implications of the basic laws in the population demand for pork, in the analyzed period.

Table 1. Results of the evaluation of the pork meat demand function

Parameters	t statistic	Probability (P)
α = -3.29255	-0.682804	0.5202
β_1 = 1.868097	1.780496	0.1253
β_2= 0.369692	3.201743	0.0186
β_3 = -0.194738	-1.208806	0.0315
β_4 = 0.43919	2.550394	0.0435
β_5 = -0.396881	-2.791444	0.2722
R^2	0.76474	
DW	1.94	
n	12	

Source: The author's calculation

Based on the probability value (Table 1.), it can be concluded that, in the observed period factors which affected on the pork demand were: personal consumption, retail prices of pork and beef. The parameters $\beta_1$and β_5 are statistical insignificant.

Another analyzed coefficient is the demand elasticity coefficient in relation to personal consumption that is the coefficient of income elasticity of demand. Its value is 0.37. As this coefficient has the corresponding sign and value significantly lower than 1, it can be concluded that the demand for pork is inelastic in relation to personal consumption. In other words, the income elasticity of demand for pork in Serbia is very low, which means that, in the analyzed period, the increase in personal consumption was faster than the demand for pork. The low elasticity of meat demand relative to personal consumption can be explained by the fact that the meat is the product belonging to the category of necessary products. In other words, pork consumption in Serbia has probably reached a high level of saturation.

Coefficient of direct price elasticity of demand is -0.19. As in the previous case, this coefficient has the expected sign, which is in line with the demand theory. However, given the very low value of this coefficient, it can be concluded that demand for pork is extremely inelastic. That means that the consumption of pork is relatively stable in terms of price change. According to theory, demand for certain products is more elastic in relation to price if there are a number of substitutes for that product. In Serbia, after consumption of pork, the highest are the consumption of chicken and beef meat. The consumption of other types of meat on an annual level (such as goat, sheep) is negligible. It can be concluded that another reason for low price elasticity of demand for pork is a small number of substitutes. In other words, eating habits of the population are the most important factor of a stable level of pork consumption.

The coefficient of cross-elasticity of demand for pork in relation to the price of beef is 0.44. The positive value of this coefficient implies that beef meat and pork are substitutes. However, its relatively low value indicates the relatively inelastic demand for pork in relation to the price of beef. In other words, the substitution of demand between pork and beef has no significant economic character, but consumer preferences dominate. That means, the prices of substitutes or other types of meat did not significantly affect the demand for pork.

Pork supply function analysis

As the estimation of the initial model obtained statistically insignificant results, several variants of model were evaluated in which certain independent variables were excluded in order to obtain a model that would be acceptable. Also, in different variants of pork supply function, independent variable price of pork meat included different length of time lag (Ppm_{t-1}, Ppm_{t-2}).
Selected pork supply function which had statistically the most significant indicators had the logarithmic-linear form:

$$\ln S_t = \ln\alpha + \beta_1 \ln Ppm_{t-2} + \beta_2 T \quad (6)$$

where: S_t - pork supply (kg); Ppm_{t-2} - real price of pork with two lags; T - time; α - constant, β_1, β_2 - parameters of the function.

When evaluating the selected supply function, the method of the least ordinary squares is used.

Table 2. Results of the evaluation of the pork meat supply function

Parameters	t statistic	Probability (P)
$\alpha = 4.056088$	27.66801	0.0000
$\beta_1 = 0.126419$	4.425925	0.0031
$\beta_2 = 0.005128$	1.756209	0.1225
R^2	0.737791	
DW	1.72	
n	12	

Source: The author's calculation

Coefficient of elasticity of pork supply in relation to price, i.e. the price elasticity of the supply (Table 2.) is extremely low (0.126). Namely, the low price elasticity of pork supply can be explained by the fact that it takes a certain period of time to get pork meat as a final product from the fattening pigs. Therefore, the possibility of adjusting production volume to the current price changes is relatively limited. Also, another reason for the low price elasticity of the supply of pork is the difficult storage of products derived from livestock breeding. That is, slaughtering of pigs can be delayed only for several weeks due to the consequences it leaves on the quality of the produced meat. Therefore, the production of fatteners becomes unprofitable because a certain price is paid for each weight class. That means that the fattening pigs must be sold at a certain moment at a given market price and in the case of rising prices of pork, farmers are not able to influence the growth of supply through livestock stock.

Analysis of the market of the product with the cyclical movements

According to Matsumoto and Szidarvszky (2015) Cobweb explains why and how certain types of market give rise to fluctuations in prices in quantities, with its mainly focus on agricultural markets. Pork market is one of the best examples of such market. Namely, a specific fluctuation mechanism is one of the most important characteristic of the pork market. The length of the cycle can be divided into characteristic phases, which are repeated over time. The "cycle of pigs" is characterized by the following five phases: in the first stage, the supply of pork is below average, while the price is above the average, and there is no increase in the number of pigs. The second phase is characterized by an increase in supply and a fall in price towards equilibrium. As a result of the high price from the previous period the number of pigs is increasing. In the third stage, there is a rise in supply (due to the delivery of the above-mentioned surplus in the number of pigs from the second phase) and the price drops towards the equilibrium level. Also, as a result of falling prices from the previous phase, in the third phase of the cycle, the number of pigs is reduced. After that, in the fourth phase, the

reduction in supply from the previous period decreases, and the price is rising again. In the fifth phase, which at the same time represents the beginning of the new cycle, the supply falls below the minimum, the price rises above the maximum, and the number of pigs grows to a normal level. In the case of a pig cycle, there is a reverse proportion of variation in the amount of supply and the relative price of pork. Also, the variations in the quantity of supply are far less than the variation in prices, which indicates of the relatively inelastic demand for pork.

In the case of the Cobweb model several variants of the model were also evaluated. Namely, the Cobweb model can be assessed for both the pork market and the market for fattening pigs, as was the case in this paper. Also, apart from the fact that the Cobweb model was evaluated for both (for pork and fattening pigs markets), the variants of the model were tested for the independent variable in the supply function, including the price of pork with one or two lags.

However, as the results of other models had statistically insignificant results, the model accepted in the work relates to the pork market, and the price of pork that is included as an independent variable in the supply function is included with two lags.

In this paper, the Cobweb model for pork meat has the following form:

$$S_t = \beta_0 + \beta_1 Ppm_{t-2} + \beta_2 T \quad (7)$$

$$Ppm_t = \alpha_0 + \alpha_1 D_t + \alpha_2 T \quad (8)$$

$$D_t = S_t = Q_t \quad (9)$$

The Cobweb model for the pork market in Serbia was calculated using the two stage least square method. Namely, due to the problem of identification of the Cobweb model, in case of empirical evaluation of the model it is necessary to simultaneously treat the supply and demand functions. More precisely, in order to obtain an impartial estimation of the model, the equations of the Cobweb model are evaluated at once using the two stage least square method. An impartial estimation of the model is achieved in such a way that the actual value of the quantity of demand in the inverse demand function is replaced by the estimated value of the quantity from the equation 7. The results of the evaluation of the supply function and inverse demand function estimates are shown in the following tables (Table 3. and Table 4.).

Table 3. Results of the evaluation of pork meat supply function

Parameters	t statistic	Probability (P)
β_0 = 90.90403	19.73476	0.0000
β_1 = 0.115447	4.619536	0.0024
β_2 = 0.605694	1.926569	0.09524

Source: The author's calculation

Table 4. Results of the evaluation of the inverse pork meat demand function

Parameters	t statistic	Probability (P)
α_0=732.0682	3.747067	0.0072
α_1=-5.364807	-3.019623	0.0194
α_2=-4.921491	-2.139417	0.0697

Source: The author's calculation

Pork meat demand function derived from inverse pork meat demand function:

$$D_t = 136{,}478 - 0{,}186 Psm_t - 0{,}917 T$$

Estimated parameters in the equations of the Cobweb model can theoretically be accepted as correct because the regression coefficient in the demand function (β_1) is negative, while the regression coefficient in the supply function (α_1) is positive. By absolute size, the regression coefficient in the demand function is greater than the regression coefficient in the supply function. In other words, because is |-0.186|> |0.1154|, it can be concluded that the slope of the demand curve is greater than the slope of the supply curve. This means that in the case of pork meat market in Serbia, exists convergent case of the Cobweb model.

An increase in the quantity of products on the market in the inverse function of demand affects the reduction of the relative price in the same time period. Also, in an inverse demand function, the estimated parameter in the quantity has an appropriate negative sign, which means that the increase in pork production changes the relative price in the opposite direction. In the case of a demand function, the parameters (derived from inverse demand functions) also have a theoretically correct negative sign, which means that in the case of rising pork prices, the demand for the same will be reduced.

In the case of the pork market, this is an example of a Cobweb model with convergence oscillations, i.e. the oscillations are getting smaller, and since -1 0.1154 / -0.186≤0 the oscillations should be settled over time. Variations in the movement of pork meat supply are less than the relative price variation, and the relatively small change in the amount of production over proportionately influences the movement of the relative price of pork. More precisely, when the quantity of pork supply increases, the relative price is below the equilibrium, while in the next period the quantity of supply is small and the relative price, due to the excess demand, is growing above equilibrium.

Such a trend is characteristic for the market where demand is relatively inelastic, and small changes in the quantity of products cause above average changes in product prices, which has already been founded for the market for pork in Serbia.

However, although it is suitable for analyzing the existence of cyclical oscillations in the markets of certain agricultural products, the Cobweb model is considered insufficient to explain complex relationships in cyclical trends in the amount of production and

relative prices. Namely, in the Cobweb model, the market for agricultural products is treated simpler, exclusively based on data on the relative price and quantity of production. However, other factors (such as trends in the input market, trends in exports and imports, etc) act on the market of certain products, which are not specially specified in the case of Cobweb model, but are incorporated into the model by variable time. Therefore, for the analysis of more complex relations, different more comprehensive models are being constructed that overcome the mentioned disadvantages.

Conclusions

Although very important branch of livestock production in Serbia, in the analysed period, pig farming has been recording retrograde production tendencies. The retrograde tendencies are reflected in the reduced number of pigs and sows, and in pork meat production stagnation. Likewise, import of pork notably increased, which had negative impact on pig farmers. As the pork market factors are concerned, in the analyzed period, the most important factor that influenced on pork supply was pork price. On the other hand the factors that influenced on pork demand were: personal consumption, retail price of pork and beef. At the same time, on the pork market existed convergent type of oscillations which indicate that a small change in pork production volume over proportionately change relative pork price.

Bearing in mind that in analyzed period pork meat import had a significant influence on the pork and pig market, future research could be focused on models that are appropriate to explain more complex market relations.

Conflict of interests

The authors declare no conflict of interest.

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AN EXPLORATION OF DISTRIBUTION CHANNELS: CHALLENGES AND OPPORTUNITIES FOR ORGANIC FOOD PRODUCERS IN CROATIA

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ABSTRACT

Organic market in the EU is growing faster than the area of production and is facing many problems and challenges. In order to obtain more information of the structure and organizational features of the organic farms in the Republic of Croatia, as well as perceptions of organic food producers about barriers that disable faster development of organic food market, empirical research was conducted on the sample of 66 organic food producers. Research findings suggest that the largest number of organic farms are small farms up to 5 hectares (ha). Organic food producers are the most prominent in the field of fruit production, and key motives for engagement in organic agriculture are their personal beliefs, health reasons and environmental care. Regarding the distribution of the organic food products, most producers sell their organic food products directly to the final consumer, mostly on family farms and local fairs. Regarding indirect distribution, specialized stores are dominant retail format, followed by wholesale. The paper gives valuable contribution, as it lists the producers' proposals for further development of organic food products market in Croatia.

Introduction

At the global and European level, the trend of growth of organic production has been recorded. Since 2000, the surface of land for organic farming has grown by 400%. Organic agriculture has been developing rapidly, and the available statistical data show that 2.7 million producers in 178 world countries practice organic agriculture

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(Willer and Lernoud, 2018) (Remark: data published in 2018 show the state in organic production in 2016). During 2016, 57.8 million hectares of organic agricultural land was recorded, where Australia leads with 27.1 million hectares.

Regarding Europe, the leader is Spain, followed by Italy, France and Germany. Italy takes the lead in the number of organic producers. Countries with the biggest organic food market in 2016 are the United States (38.9 billion EUR), then Germany (9.5 billion EUR), France (6.7 billion EUR) and China (5.9 billion EUR). The biggest share of the organic market in the entire market is in Denmark, then Luxembourg, Switzerland, Sweden and Austria. Organic product retail has grown globally from 2000 till 2016 by 460%.

According to the available data on organic agriculture and the European market, the European organic production is well developed. In many European countries, market grows faster than the production and domestic supply cannot meet the demand. The analysts predict that organic food and beverage market in Europe could grow at a compound annual growth rate of about 7% in income by 2020 (Technavio, 2016). The research conducted in three countries of the EU (Denmark, Italy and United Kingdom), concerning organic food consumption at its very peak, show that those three markets are at very different stages. In Denmark, organic market is very developed due to the existence of a broadly recognized official organic label and the fact that many organic food products are sold in supermarkets at relatively low prices. In Italy, the level of organic production is high, but domestic consumption is relatively low and most organic food products are exported. Besides that, most market transactions happen on local markets, where trust in farmers presents a guarantee to the consumers of the quality of the organic products, rather than the labelling scheme controlled by the government. In the United Kingdom, demand for organic raw materials has been rapidly growing. Distribution structure is similar to the Danish scheme in that the products are mainly sold in the supermarkets (Denver and Christensen, 2007).

From the position of the producers, some of the obstacles for the development of organic market are (Kottila, 2010; Vlahović et al., 2015; Koreleska, 2017): poorly developed and unorganized market, lack of cooperation and communication in the supply chain, lack of marketing knowledge and low prices of organic food products. In most EU countries, main distribution channels for the producers (processors) of organic food are (Hamzaoui-Essoussi and Zahaf, 2012; Dovleac, 2016; Enjolras and Aubert, 2018; Jarczok, 2018): direct sale, specialized organic food product stores and supermarkets.

In the Republic of Croatia, most farms that are involved in organic production are small family agricultural holdings *(hrv. obiteljsko poljoprivredno gospodarstvo - OPG)*, that also face many challenges. The results of the research conducted by Petljak (2013) show that most farms are smaller than 5 hectares and fruit-growing is the most dominant branch. The producers pointed out their personal beliefs as the key motive for organic production.

Distribution channels in Croatia are mostly connected with the terms *"local market"*, *"alternative market"*, *"direct sale"* and *"short supply chains"* because most organic

food products in Croatia are still sold by direct channels, and only a small percentage of domestic producers distributes their products through retail (Petljak, 2013). One of the major constraints for a further development of organic food market in Croatia is low farmers' ability to act independently on the market. In addition, the distribution within the organic food sector is quite inefficient. Despite growing interest for organic food market there is a lack of studies dealing with organic food distribution channel in developing countries, such as Croatia.

Considering the rapid growth of the organic food market and the mentioned challenges for producers, especially regarding distribution channels, the research questions *(RQ)* which arise are the following:

RQ1: How are organic food product distribution channels organized?
RQ2: What are main structural and organizational features of organic family farms?
RQ3: What are the perceptions of organic food producers about barriers that disable faster development of organic food market?

Theoretical background of the research

Organic agriculture characteristics and legislation in EU

In European countries and in the rest of the world, different terms are used for organic agriculture. Besides the term "organic" (England) and "biological" (France, Italy, Netherlands and Portugal), the term "ecological" (Denmark, Sweden, Spain) is also used. In Germany, terms "ecological" and "biological" are most common (Blair, 2012). In the Republic of Croatia, the term organic agriculture is used. Over time, different authors have in different ways defined, or described organic agriculture. According to Znaor (1996), organic agriculture is a system of agricultural management that aims at ethically acceptable, ecologically clean, socially just and cost-effective agricultural production. Organic agriculture in production strives at the complete exclusion of the input that does not originate from agricultural holding, considering local conditions that require specific management systems. This is achieved through the use, where possible, of agronomic, biological and mechanical methods, against the use of synthetic matters, for performing specific functions inside the system (Renko and Bošnjak, 2009). Organic agriculture represents agriculture which is conceptualized in the way that it protects the soil, water, air, plants, animals and genetic resources, it is not degrading for the environment, it is technically appropriate, economically stable and socially acceptable (Kisić, 2014).

At the international level, general principles of organic agriculture are defined by two organizations: Codex alimentarius Commission FAO/WHO-a (Food and Agriculture Organization of the United Nation/World Health Organization) and International Foundation for Organic Agriculture - IFOAM, the roof organization with around 750 members in 108 countries (Znaor and Landau, 2014). According to the IFOAM definition, organic production is a production system that maintains the health of the soils, ecosystems and people and is based on ecological processes, bio diversity and cycles adjusted to the local conditions, and not on the use of input with side effects.

Organic agriculture combines tradition, innovation and science to benefit mutual social environment and promotes fair relations and good quality of life for all who are engaged. Although there are many different definitions of organic agriculture, every definition includes ecology, care, health and fairness.

Organic agricultural farms are usually smaller, diversified and more extensive than the conventional ones. Organic farmers pay special attention to the protection of the environment, nature and animal welfare (Song Lee et al., 2015). Due to negative aspects of capital-intensive agriculture, in the sense of negative ecological, social and economic consequences caused by mass production, specialization, standardization of the product and high income, there has been an increased interest of the foreign and domestic scientific and general public for organic agriculture (Petljak, 2011). In recent decades, organic food has become very popular among the producers, retailers and consumers (Jones et al., 2001; Cerjak et al., 2010; Ham et al., 2018). The popularity of organic food is the result of many factors. The most important are: a lot of unfarmed land suitable for organic production, less contamination of the eco system, growing concern of the consumers for their health and increasing importance of renewable resources in the global environment (Renko and Bošnjak, 2009). Growing demand for organic food products whose production is not harmful for the environment is also one of the reasons of the expansion of organic agriculture (Rodale, 2010). However, the stated reasons are only starting points for a healthy organic agricultural development. The market is considered the key factor of organic agricultural development, where a farm, as an elementary unit on the organic food product market, meets a series of issues like: the legislative, education on the methods of organic agriculture and organic food production, higher costs and narrowed distribution channels (Renko and Bošnjak, 2009). At the beginning of organic agriculture development, ecological awareness was the key motive of production and consumption of organic food, but later, health reasons and evidence that organic food is closely related to the healthy lifestyle have appeared as the key motives (Götze et al., 2016).

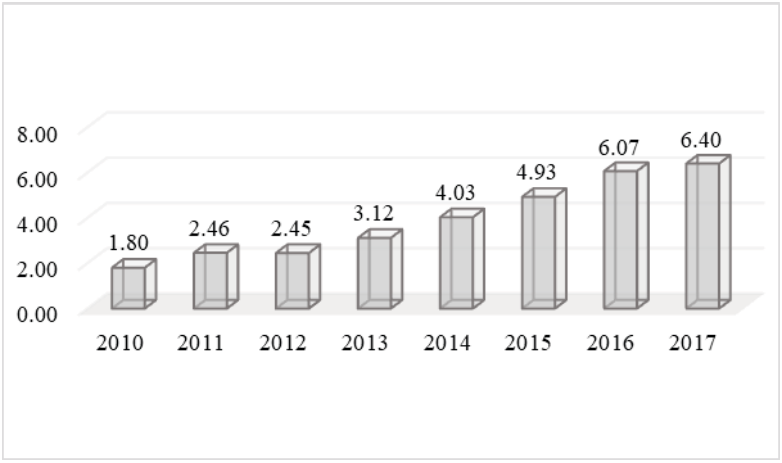
The European Union (EU) legally regulated organic agriculture by adopting the regulation on organic agriculture and production in 1991 (EU Regulation no. 2092/91). In Croatia, organic agriculture was regulated by law in 2001, when the first Organic Production of Agricultural and Food Products Act (Official Gazette, 12/01) was passed, which was in line with the EU and IFOAM regulative. The new Organic Agriculture and Ecological Product Labelling Act (Official Gazette, 139/10) was adopted in 2010, and Organic Agricultural Production Regulation in 2016 (Official Gazette, 19/16). Organic agriculture has been identified as the key element in sustainable management of European natural resources. In line with that, the European Commission (EC) suggested a new draft of the organic legislative in 2018, with the aim of creating foundations for sustainable development of ecological production and its positive effects on the environment, and, in so doing, ensuring an efficient functioning of the internal market of organic products and fair market competition, which helps the farmers to earn fair income, ensures consumer trust, protects consumer interests and supports short

distribution channels and local production (EU ORDINANCE 2018/848). Organic food production requires more resources (COGNIZANT, 2014), especially human resources. In addition, production depends on high seasonality and weather conditions, products are easily spoiled and require specific storage conditions. These features influence the high levels of insecurity and risk regarding market prices (which can be up to 30% higher) and ensuring the amounts for retailers. Consequently, access to the market is much more difficult, especially due to the competition with imported organic foods.

Organic production in the Republic of Croatia

Croatia records a significant trend of increasing the land with organic production (Figure 1). During 2016, 3,546 producers with the surface of 93.814 hectares were recorded, which makes 6.07% in relation to total agricultural surfaces (Ministry of Agriculture according to the data from the Croatian Bureau of Statistics, 2016). According to EUROSTAT, in 2017 there were approximately 4,023 organic producers, 357 refiners, 23 importers and 1 exporter of organic food products.

Figure 1. The share of agricultural surface with organic production in the total agricultural surface in the Republic of Croatia from 2010 to 2017 (in %)



Source: authors, according to the Croatian Bureau of Statistics, 2016

Croatia applies all the regulations regarding organic food production and labelling, including the national label for organic food (Labelling of Food and Animal Feed in Organic Production Regulation, NN 25/11), however, certified organic food production in Croatia is considerably lower than in other EU member countries. Croatian organic product market is not well organized. There is a low offer of processed products due to limited processing capacities, and the consumers are not well informed (Brčić-Stipčević and Petljak, 2012). Croatian Ministry of Agriculture points out that the issue with the organic product market is the fact that fresh, organic products are mostly of domestic production, while organic processed products are mostly imported and can be found in specialized stores, healthy food stores and supermarkets. More than 50% of

products are of foreign origin. Often, domestic supply cannot satisfy the demand and domestic chain stores that sell organic products offer a variety of imported products. Those imported products are mostly food that can be easily grown in Croatia, like beans, barley, buckwheat, herbal teas etc. Therefore, the term organic food comes into question if that food has to travel thousands of miles to reach the consumer.

Characteristics of the organic food products market

The production of organic food is facing many problems and challenges and cannot meet the fast growing organic market in the EU. From the producers' perspective, some of the main obstacles are (Kottila, 2010; Vlahović et al., 2015; Koreleska, 2017): poorly developed and unorganized market, lack of cooperation and communication in the supply chain, lack of marketing knowledge and low prices of organic food products. From the demand side of the supply chain, i.e. the consumers of organic products, according to Padel and Foster (2005), key issues are: limited availability of products, especially in supermarkets, high retail prices, consumers being insufficiently informed i.e. they are not familiar with organic food products or organic food labels. Renko and Bošnjak (2009) think that Croatian organic food producers have not adjusted their assortment and choice of location to the consumers, who point out that the greatest obstacle for buying organic food is not knowing where to buy them.

Many researchers and research studies have dealt with the issues of who the consumers are and what are their main reasons for buying organic food (Harper and Makatouni, 2002; Padel and Foster, 2005; Shaw Hughner et al., 2007; Cerjak et al., 2010: Żakowska, 2011; Dimitri and Dettmann, 2012; Rong-Da Liang, 2016; Kranjac et al., 2017; Hashem et al., 2018), while there are considerably fewer of those who study the issue from the position of the producer, i.e. distribution of organic products onto the market. mMost literature about organic food consumption has been recorded in the USA, followed by Great Britain, Italy, Germany and Greece (Hemmerling et al., 2015).

Several studies from earlier periods show that high prices of organic food products is one of the main reasons why organic consumption is still low (Magnusson et al., 2001; Shafie and Rennie, 2012; Götze et al., 2016). However, in the last decade, organic market of the EU has grown faster in relation to expansion of agricultural surfaces under organic production. The indicators of consumption and behaviour of organic food consumers are different. According to the research conducted in Croatia (Cagalj et al., 2016), consumers are ready to spend more for fruit and vegetables from organic production (apples, tomatoes), if there is proof of organic production and because of the belief in health benefits of organic food. The same support we get from the research results conducted in Sweden (Bosona and Gebresenbet, 2018).

In the research conducted by Rong-Da Liang (2016), consumer trust in organic food products and their effects on health have also had a considerable impact on the decision to buy organic products. Many other studies (Götze et al., 2016; Escobar-López et al., 2017; Hashem et al., 2018), confirm the fact that health, ecological acceptability and taste are

important motives which encourage organic food production. Demand for organic food in the EU has been growing due to rising concern about negative external influences connected with the effects of intensive cultivation systems on human health and environment (Nasir and Karakaya, 2014). Basically, organic food consumption is strongly connected with social and ethical principles and beliefs. Consumers mostly describe organic food as food that is ecologically acceptable, has a positive effect on health and has good sensory quality, while the main disadvantages are high price and insufficient representation on the market.

In her research, Kottila investigated interaction between the participants in the organic food supply chain and established that information exchange and cooperation among the interested parties in the supply chain is mostly poor and the main participants, from producers to retailers do not have clear and common goals, especially in relation to the need of the consumers that buy organic products (Kottila and Rönni 2008; Kottila 2010). Research conducted by Bandara et al. (2017) examines conditions where partners (buyers and suppliers) cooperate in the supply chain, i.e. they interact in that partnership. Relation that is based on the power of an individual (the buyer) can influence the quality of the relation between the partners, and indirectly, it can influence operative results of the suppliers.

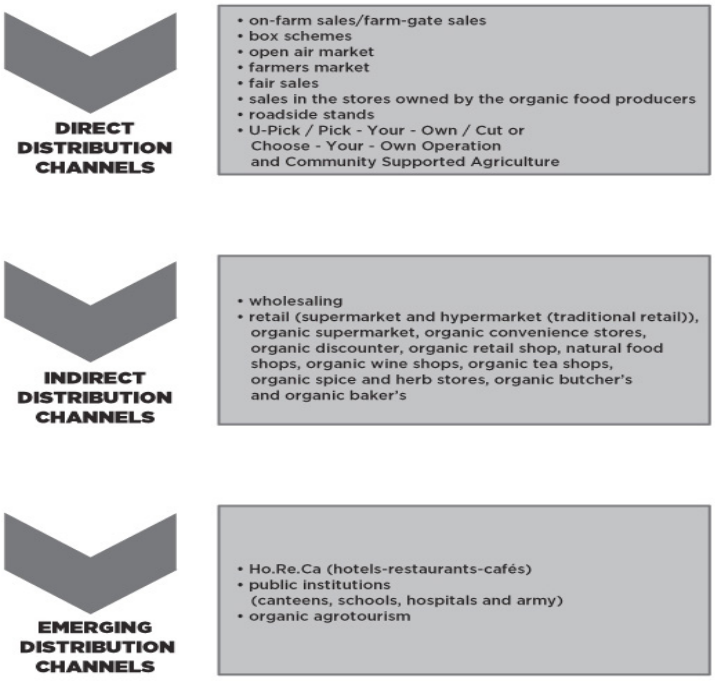
The study of Marques Vieira et al. (2013) investigates the role of wholesale and retail as mediators involved in organic supply chain. If organic food products are sold under the private label (PL), then most value is kept by the retailer. The retailer strategically connects organic food product with its reputation using the own private label. However, although the retailer invests in the promotion of the organic food private label, it still depends on organic food producers to fulfil consumer requirements. This suggests the partnership needs to be created among small producers and retail chains to satisfy the needs of the consumers. Furthermore, retail plays a key role in the development of this market by spreading information on the benefits of organic food consummation on the health of the consumers and for the establishment of a reliable base of suppliers. The results of the research made by Kottila (2009) show that there is a need for more horizontal cooperation among the actors specialized in organic food production, including the commercial, governmental and non-governmental actors, which could contribute to a better understanding and development of knowledge in the added value of organic products. With the increased demand for organic food in the EU, this represents a strong incentive for creating special agreements between the producers and the retailers, development of private labels (Jonas and Roosen, 2005) and investments in the quality aspects.

Hamzaoui Essoussi and Zahaf ‘s research from 2008 shows that small communities tend to adhere to local producers of organic food for three main reasons: low availability of organic food in the supermarkets in small communities, greater trust of the consumers in local farmers than in supermarkets and direct marketing of food from the local supplier to the consumer. The authors think that modern distribution channels in small communities must be aware of different needs of the consumers compared to those in large cities. For example, the price does not influence their decision, but rather, it is the trust in the producer.

Organic food distribution channels

The analysis of the domestic and foreign literature has shown that there is no unified definition of distribution channels for organic food products. According to Brčić-Stipčević et al. (2011), distribution channels of organic agricultural products can be divided into *(1) direct distribution channels, (2) indirect distribution channels and (3) emerging distribution channels* (Figure 2).

Figure 2. Organic food distribution channels



Source: authors, according to Brčić-Stipčević et al., 2011

Direct distribution refers to direct sale of organic food products to the consumers. Those distribution channels are: on-farm sales/farm-gate sales, box schemes, open air market, farmers market and fair sales, sales in the stores owned by the organic food producers (Brčić – Stipčević et al., 2011), roadside stands, U-Pick / Pick – Your – Own / Cut or Choose – Your – Own Operation and Community Supported Agriculture (Brunch and Ernest, 2010).

Indirect distribution channels of organic food products in the Republic of Croatia are wholesaling and retail. Wholesalers buy organic food products from multiple producers and offer them to retail, i.e. to retailers and restaurateurs. Organic food product retail includes sales in different retail formats: supermarket and hypermarket (traditional retail), organic supermarket, organic convenience stores, organic discounter, and different specialised retails like small stores with the dominant assortment of organic food products: organic retail shop, natural food shops, organic wine shops, organic

tea shops, organic spice and herb stores), organic butcher's and organic baker's (Brčić – Stipčević et al., 2011). Emerging distribution channels include Ho.Re.Ca (hotels-restaurants-cafés) and public institutions (canteens, schools, hospitals and army), as well as the distribution of organic food via organic agrotourism (Petljak, 2013).

Most organic food producers sell their products in supermarkets (Willer and Lernoud, 2016), via direct sales, and in specialized stores. In the case study conducted by Sanders et al. (2016), among the analysed countries of the EU, in Italy, France and Germany there is up to 50% of organic food sold via specialized retail and direct sales. Opposite to that, in the Czech Republic, Denmark and the United Kingdom, more than 70% of organic food is sold in supermarkets. Since in the last decade organic food production has been constantly growing, some questions arise: to what extent do organic food product supply chains function efficiently, do they share the common added value and the risks evenly among them, what effect do primarily small farms have on the primary producers and do they create and maintain the trust of the consumers. Lack of statistical and public data on the organic food market for specific products in the EU countries and in Croatia, especially information on the supply chains, is one of the factors that complicates the search for answers to all the above questions and also one of the reasons for conducting this research.

Principal actors of this chain are agricultural producers, food industry, distribution sector and retail sector. According to the data acquired from EUROSTAT and FiBL-AMI and the overview of the existing scientific and expert literature, it can be concluded that organic food product markets differ considerably and have specific characteristics in every EU country; most organic food producers sell their products in supermarkets, directly as well as in specialized stores; integration and cooperation are important factors that can strengthen organic food supply chains, and the length of the supply chain and power relations among the participants are equally important as the type of the supply chain; produce like the fruit and vegetables dominate on the organic food markets in many EU countries, especially in Italy, Germany and France, as well as in Croatia, followed by dairy and few other processed products. Factors that can positively influence the development of high-quality organic food products are (H. Essoussi and Zahaf, 2008; Kottila, 2009; Żakowska, 2011; Garner and Ayala, 2018; Bosona and Gebresenbet, 2018; Scalvedi and Saba, 2018) better availability of organic food products; good organization of the supply chain; better integration and cooperation among the members of the supply chain; good promotion and better information on the advantages of consummation of organic food products; wider range and differentiation of finished (processed) products. The factors that can negatively influence the quality of the organic food market are (Żakowska, 2011; Wägeli and Hamm, 2016; Götze et al., 2016; Scalvedi and Saba, 2018) insufficient domestic production and dependence on the import of processed products; inefficiency in the supply chain; lack of interest in different forms of connection and cooperation of all the actors in the supply chain; constant oscillations of prices, insufficient or inadequate facilities for storage and logistics; lack of marketing orientation.

Research on the distribution channels of organic food products in the Republic of Croatia

Research methodology

The data for the research on the distribution channels of organic food products in the Republic of Croatia, due to the specificity of the research topic, have been gathered with different research methods – via an online survey, via phone calls and face-to-face conversations in the sales units (mostly in Zadar county). The survey comprised of altogether 27 questions structured in three parts. The first part related to the structural characteristics of the production unit with the questions about the size of the unit, locations of the production unit and the activities farmers perform. The second part dealt with the organizational features of the unit that are defined with the organization and methods of management, workforce organization, organization of the sales and other organizational activities, while the third part related to the suggestions for future market development. Email addresses of the organic food producers were found on the Ministry of Agriculture website, on the List of organic producers in 2015. Total of n=66 respondents participated in the research. Data collected by the survey were analysed with the use of the SPSS v.23.0 software. Univariate analysis was conducted to determine frequencies of producers' answers.

Research results and discussion

Description of the sample

The gender structure of the sample was 70.3% men and 29.7% women. The age structure of the sample slightly shifts to the older respondents; the most prevalent age groups in the sample are above 50 years old. Furthermore, over half of the respondents have completed secondary school (56.1%), followed by high school (27.3%). Table 1 shows socio-demographic characteristics of the sample.

Table 1. Socio-demographic characteristics of the sample

(Total)		%
Gender	Male	70.3
	Female	29.7
Age	21 -30	4.5
	31 – 40	12.1
	41 – 50	28.8
	51 -60	37.9

Education	More than 60	16.7
	Basic school	1.5
	Secondary school	56.1
	High school	27.3
	University degree	15.2

Source: empirical research

Most producers are registered as the producers – family agricultural units, manufacturers or joint-stock companies (67.7%). 17 producers (26.2%) are registered as mixed units for production and processing (Table 2).

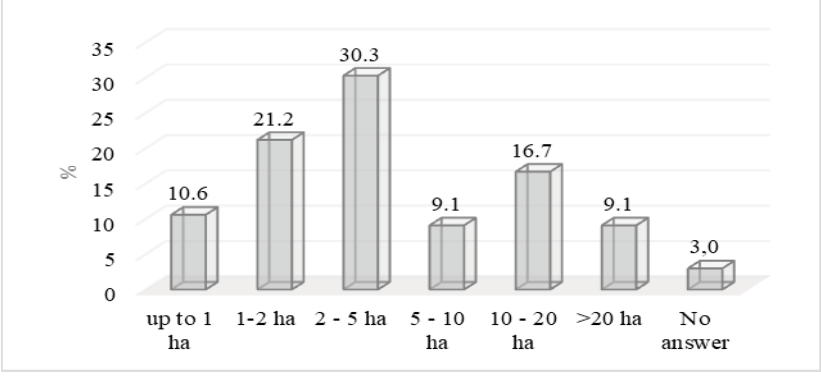
Table 2. Type of the registered subject

Type of the registered subject	n	%
A (registered producer; family farming (cro. OPG), manufacturing, joint-stock business)	44	67.7
B (registered processors)	1	1.5
C (registered importer)	1	1.5
AB (mixed unit – production/processing)	17	26.2
D (other forms of the registered units)	2	31.0
Total	66	100%

Source: empirical research

Most producers have up to five employees (78.5%) per unit. A smaller number of producers (16.9%) have 6 to 10 employees, and most production units are run exclusively by the family members. Only 4.6 % of the units have more than 21 employees, which mostly includes seasonal workers and part-time employees.

Figure 3. Organic producers' surface under organic farming



Source: empirical research

According to the surface of organic production (Figure 3), the research shows that most dominant are the producers with the surface of up to 5 hectares (62.1%), which is compatible with the data from many other countries in Southeast Europe. Most producers produce organic fruit (n=36), vegetable (n=20) and grow organic wine (n=15). Few producers grow medical and herbal plants (n=13), crop farming (n=11), olive farming (n=8) and beekeeping (n=5).

In order to examine the statistically significant correlation between distribution channels and size of the surface under organic production, chi-square (χ^2) test was calculated (Table 3). The obtained results (χ^2=13.422; p>0.05) show that there is no statistically significant correlation between distribution channels and the surface of agricultural land under organic production, which furthermore implies the need of investigating factors which influence the decision making process when choosing distribution channel.

Table 3. Cross tabulation of agricultural land (in ha) under organic production and the distribution channels

	Direct sales (n)	Sales through intermediaries (wholesale and/or retail) (n)	Direct sales and sales through intermediaries (n)
up to 1 ha	1	1	1
1 – 2 ha	8	1	0
2 – 5 ha	9	0	7
5 – 10 ha	4	0	0
10 – 20 ha	7	1	2
more than 20 ha	11	2	2

χ^2=13.422; p>0.05

Source: empirical research

Motives for organic production

Key motives for organic production are primarily personal beliefs of producers (n=16), then there health reasons (n=11) and environmental care (n=10). Producers see governmental incentives, friends' persuasion, unemployment and financial reasons as less motivating. Similar findings on the motives for organic production have been found in other researches (Kubala et al., 2008; Cranfield et al., 2010; Petljak, 2013; Vlahović et al., 2015).

Distribution channels of the organic food producers in the Republic of Croatia

Research results have indicated that 60.6%producers sell their organic food products directly to the final consumer, while 13.6% of them sell their products indirectly, via a mediator (wholesale, retail). Almost one fifth of the respondents use both channels of distribution equally (19.6%). Only 6% of the producers sell their organic products via the Internet (Table 4).

Table 4. Main distribution channels of organic food products

Distribution channels	n	%
direct sale to the consumers	40	60.6
sales via mediators (wholesale, retail)	9	13.6
equally market directly or via mediators	13	19.7
Internet sale	4	6.0
Total	**66**	**100**

Source: empirical research

Producers that sell their products directly to the final consumers were asked to list the distribution channels they use for placing their ogranic products on the market. 42 of them sell on the family farm, 29 on the fairs and fewest sell on the local markets (n=15) and via home delivery (n=12). Organic producers that distribute their products via indirect channels, do so mostly in specialized stores (n=12), or to the wholsale buyer (n=11). Smaller share of producers sell their products via groups of solidary exchange, convenience stores, agricultural cooperatives and restaurants.

To establish the attitudes of the organic food producers about organic food market organization, the respondents were asked to express the level of agreement/disagreement with certain statements on a Likert scale, where 5 represented complete agreement and 1 absolute disagreement. Based on the results displayed in Table 5, it can be concluded that most respondents agree that for further development of the organic food market, it is necessary to form partnerships (mean=4.10; SD=1,185).

Table 5. Producers' attitudes on organic food market organization

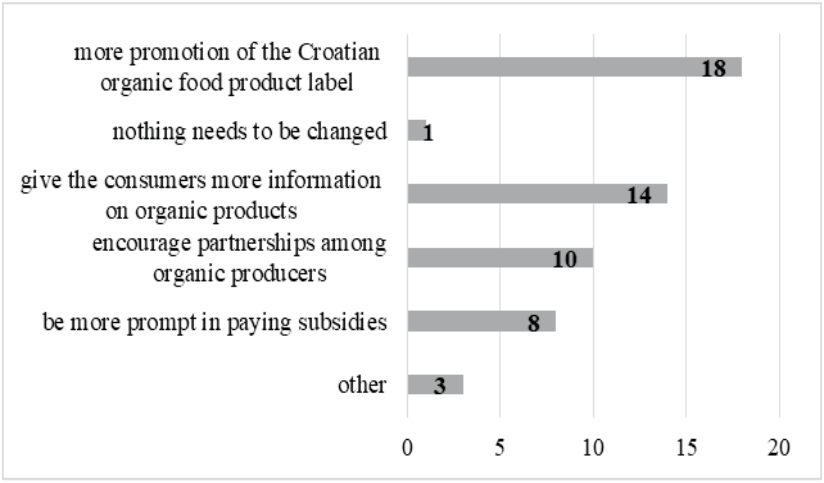
StatementS	Mean	SD
For a serious distribution of organic food on the market, it is necessary to form partnerships among the domestic organic food producers, due to insufficient number of individual organic food products.	4.10	1.185
I manage to sell organic food products regardless of the way how I distribute them on the market.	3.81	1.180
I would produce more organic food products, if I had a secure buyer; dependable distribution channels.	3.79	1.457
I sell my products at the farm to avoid high costs of distribution to final consumers.	3.22	1.33

Source: empirical research

Organic producers' suggestions for further development of organic food market in the Republic of Croatia

According to the respondents' opinions, further development of organic food production in Croatia should lie on the following factors (Figure 4): more promotion of the Croatian organic food product label (n=18), more information on organic products for consumers (n=14), more cooperation among organic producers (n=10) and more responsibility from relevant institutions (Ministry of Agriculture) in terms of prompt payment of subsidies (n=8).

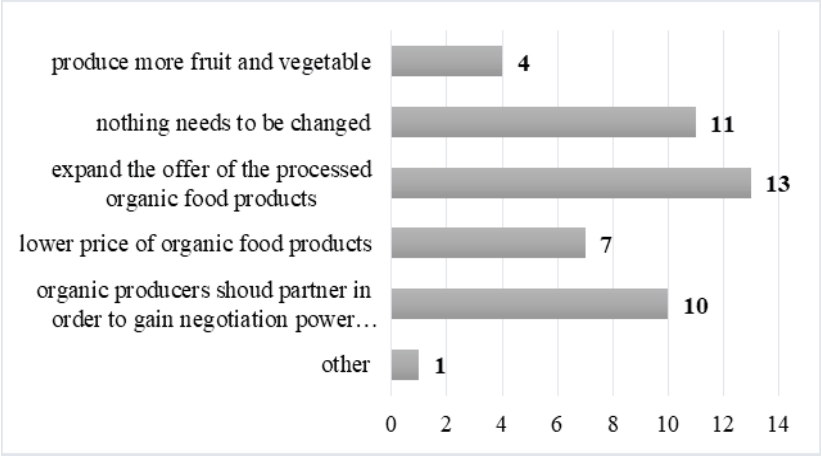
Figure 4. Producers' suggestions to the Ministry of Agriculture



Source: empirical research

Respondents think that for further development of organic food market in Croatia, domestic producers should expand the offer of the processed products while small organic producers must be encouraged to join larger producer's organizations to gain power when negotiating with the retailers. In addition producers need to be encouraged to produce more fruit and vegetable and lower the prices of organic products (Figure 5).

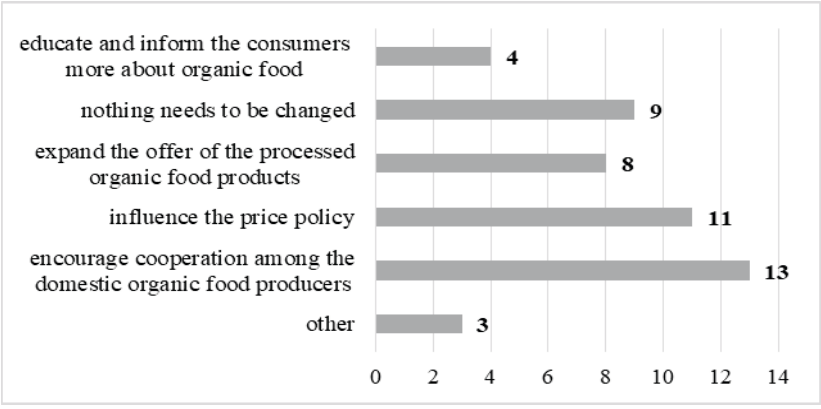
Figure 5. Producers' suggestions for future development of organic food market in the Republic of Croatia



Source: empirical research

Respondents think that for future development of organic food product market in Croatia, food retailers should (Figure 6): encourage cooperation among the domestic producers, influence the price policy, educate and inform the consumers more and expand the offer of organic products. In order to improve cooperation and communication of organic food producers with other stakeholders in supply chain, they need to build a relationship based on mutual trust and commitment. Similarly, but on the example of traditional food products, the study by Mesić et al. (2018) revealed that relationship based on trust, commitment, economic satisfaction, good reputation and low level of coercive power and conflict have a positive influence on the supply chain performance.

Figure 6. Producers' suggestions for future development of organic food market in the Republic of Croatia – retailers' perspective



Source: empirical research

76.2% of respondents see rising demand and a significant progress of organic food production in the future, and only 4.8% think that the demand will be falling. The rest of the respondents predict that the offer and demand will remain the same as now.

Limitations and recommendations for future research

Considering the results of the research, one should bear in mind the existing research limitations. First limitation refers to the research sample. Although the survey was sent to a larger number of addresses of organic producers, only a small number of organic food producers participated in the research. That kind of sample creates a partial picture of the state of organic food agriculture, especially of organic food distribution channels. Further research should be based on a qualitative examination of the producers via face to face interviews.

Conclusions

The choice of the distribution channel is of great importance, especially for small organic food producers. Organic producers can choose among direct channels of distribution, like ordering a green box, groups of solidary exchange, farm-gate selling or selling in their own stores, and indirect distribution channels, the so-called modern retail like the supermarkets, specialized healthy food stores, restaurants and other mediators. All of the above-mentioned forms of distribution brings certain advantages and disadvantages, and the choice of distribution channels should be based on the size of the farming unit, particularity production, the level of development and the location. Also, especially for small farms, it would be good to maintain the connection with the final consumer that can support local agriculture, short dustribution channel in particular.

In order to gain a clear picture of the distribution channels of organic food products in the Republic of Croatia, the research among the Croatian organic food producers was conducted. The findings suggest that most organic farm lands are smaller than 5 ha. Out of the activities organic producers practice the most, fruit farming is most represented, and the main motive for organic farming are personal beliefs. The organic food producers distribute their products mostly directly, through selling at the farm. The reason for that is big distrust and insecurity, as well as discrepancies in the law and regulations of the Republic of Croatia, where large producers are in a considerably more dominant position than the smaller ones.

There is a small percentage of those who market their organic food products via indirect channels in specialized stores and with the buyers - wholesalers. The respondents answered the question about the actions needed for further market development. Domestic organic producers pointed out that education and informing the consumers are areas which need most attention from the Ministry of Agriculture. In addition, they deem partnerships among the domestic producers necessary, in order to gain power in negotiating with retail chains and state. Furthermore, for future market development, there is also a need for encouraging cooperation between the leading food chain retailers and the producers. Domestic producers should form and join associations in order to

negotiate with the supermarkets, while the leading supermarket chains should initiate cooperation with the domestic producers of organic food.

The results of the conducted research can be applied for scientific and practical purposes. It is therefore at disposal to organic food producers and retailers, aiming at better understanding and achieving the desired channels of distribution. The findings can also serve as the guidelines for the Ministry of Agriculture, while analysing the future of organic agriculture in the Republic of Croatia. The goal is to develop organic agriculture because it is Croatia's partner for sustainable future.

Conflict of interests

The authors declare no conflict of interest.

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THE ECONOMIC EFFECTS OF FARM VEHICLE-RELATED TRAFFIC ACCIDENTS – A COMPARATIVE ANALYSIS OF WESTERN AND NORTHERN SERBIAN MUNICIPALITIES

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ABSTRACT

There are numerous and diverse Serbian road users or traffic participants on a daily basis. Farm vehicles are also considered participants. In fact, from all the farm vehicles engaged in traffic, it is tractors that are involved the most in traffic accidents. In this paper, we will present valid data on tractor-related traffic accidents during the 2012-2016 period, with a focus on areas under the jurisdiction of two police administrations from different parts of Serbia - Valjevo and Subotica. By analyzing data on farmsteads and comparing traffic accidents in these areas, we pointed out the multiple negative economic effects and possible measures for their mitigating, as well as the differences between the regions of western and northern Serbia. This data, indicates that there should be more focus on the consequences resulting from these incidents as they indicate the most diverse segments of damage in the area of agriculture.

Introduction

Criminal offenses against public traffic safety, has now become a world trend and a big problem in the 20th century. The United Nations (hereinafter: UN) and the World Health Organization (hereinafter: WHO) estimate that the importance of traffic accidents is rising and that by 2020, it will rise to third place as a cause of death on a global level. Also, WHO data shows that traffic accidents were the second leading cause of death among persons aged 15 to 29 in 2001, and the first leading cause of death among men of the same age. Youth participation in the total population in OECD countries was only

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10% in 2004, while the percentage of young drivers in the total number of those killed in road crashes amounted to as much as 27% (OECD, 2006). At the same time, traffic accidents are the leading cause of death among those between 15 and 44 (WHO, 2004). This particularly applies to traffic road accidents because they have the greatest and most severe consequences in terms of the number of casualties and the damage caused. These are the consequences that directly affect participants in traffic accidents, but also every state, due to a reduction of the gross domestic product. One of the important branches that affect the GDP in every country is agriculture. Traffic participants driving farm vehicles are on the road daily, and therefore they also take part in traffic road accidents. Drivers belong to all age categories, especially tractor drivers, and not only in Serbia but everywhere.

There are numerous studies in the world that aim to help increase road traffic safety and reduce the amount of damage resulting from these accidents whereupon farm vehicles, above all tractors, are involved. Some authors support the use of simulations to assess the ability of minors to handle tractors safely (Marlenga et al., 2017). Other authors, using the SafeDriving application, demonstrate the way a mobile electronic device can be used to monitor tractor stability (Liu et al., 2013). On the other hand, some authors are engaged in developing a computer program for the design of ROPS - the rollover protection structure (Ayers et al., 2017). Other domestic authors have also pointed out the dangers of farm vehicles, primarily tractors, as road traffic participants, noting that due to the fact that these are slow moving vehicles, there are often long lines of vehicles on the roads, causing hazardous situations due to the perilous overtaking of tractors. Furthermore, they gave some suggestions on how to improve general road safety in such situations (Marković et al., 2013). Important is their proposal that the Road Traffic Safety Law should also regulate the installing of cabs or tractor frames, which would reduce the consequences of overturned tractors. A technical inspection should regularly check the condition of the cabins or frames so that they can effectively protect drivers or passengers from injury. These proposals are in line with the aforementioned international experiences. The danger of driving a tractor at night is also recognized in research papers by domestic authors (Pešić et al., 2010), which contain the following statement, among others: "It is a very frequent occurrence that tractor trailers are loaded with a certain cargo that covers the light signaling devices at the back of the vehicle. This would be the equivalent of having no rear light signaling devices."

Bearing in mind the mentioned international data and the domestic research papers, we tried to present in a limited manner the relevant data pertaining to road traffic accident victims driving farm vehicles on the roads in Serbia in the period from 2012 to 2016, in which tractors were involved. The 5 year period is a sufficiently lengthy one, and relevant data published by official authorities was used. We paid special attention to areas that are under the jurisdiction of two police administrations from different parts of Serbia - Valjevo and Subotica. The Police Administration (hereinafter: PA) in Valjevo, covers the area of six municipalities within the territory of the Kolubara Administrative District - Valjevo, Ub, Lajkovac, Ljig, Mionica and Osečina, including to some extent

the Ibar Highway - one of the most important thoroughfares roads in the country. The area of PA Subotica includes, also six municipalities - Subotica, Ada, Bačka Topola, Mali Iđoš, Kanjiža, and Senta.The same data was also analyzed compared with the official data of the PA of Valjevo and the PA of Subotica for criminal offenses against public traffic safety in the same 5 year period. The area of PA Subotica involves a border area located at the entrance of the most important international thoroughfares in Serbia, where there is a high frequency of passenger and freight traffic. The area under the jurisdiction of the PA of Subotica was of interest to us as it involves a territory with the same number of inhabitants as in the PA of Valjevo.

Based on the appropriate economic indicators, we tried to present data regarding the damage (material and non-material) resulting from road traffic accidents in these two areas. Each region has six municipalities, so data was analyzed both for municipalities individually and for the regions. Negative economic effects are indicated in the opportunity costs, which are manifested due to the injury or death of a farmstead member, but also other costs caused by the death of a farmstead member.The aim of the research and analysis is to point out the complexity of the economic damage arising from traffic accidents and the consequences for farmstead members.

This paper presents and tests certain hypotheses, pointed out the methodology of the research and the importance of the analysis for improving the road traffic safety in the mountain and plain regions, as well as the possible measures for mitigating the negative effects. In the end, we presented some conclusions that confirmed our hypotheses which are the basis of this paper. It is not known to us whether any other Serbian authors have dealt with a comprehensive analysis of the negative economic effects arising from the aforementioned types of traffic accidents that occur on the roads in the Republic of Serbia.

Literature review

Particularly worrying are the data on the harmful consequences of traffic accidents in view of global traffic statistics. When these data are taken into account, and the reality in the Republic of Serbia tallies with these catastrophic figures, the data on the level of economic and social damage gain even more significance. According to 2007 data from in Europe, there were 1,300,000 road traffic accidents that killed more than 127,000 people while more than 2.4 million were injured or otherwise disabled, and the damage amounted to between 1.5 and 2.5% of the GDP. Of the total number of all casualties, 20% were young people, aged 18 to 25. The direct and indirect costs of the casualties of road traffic accidents are estimated at approximately 2% of the European GDP (European Charter, AMS, 2009).

On the other hand, the development of transport infrastructure, and technical and technological progress contributes to increasingly intensive traffic. Consequently, the factors contributing to the occurrence of road traffic accidents and, consequently, traffic offenses, are also escalating, which implies the total offenses against road traffic safety within a given time and space. Road traffic accidents and the traffic-related death rate

are a major problem for modern civilization. To reduce the number of casualties in road traffic accidents is therefore a worldwide requirement.There is a special focus on the issue of traffic-related victims, especially in the European Union and the UN (UN, EU 2010). Thus, on March 2, 2010, the UN General Assembly unanimously adopted Resolution No. 64/255 on implementing road safety activities and proclaimed the period 2011-2020 as the Decade of Action for Road Safety targeted at road traffic casualty reduction on roads throughout the world by increasing activities on the national, regional and world level (UN, 2010), with May 11, 2011 being designated as the beginning of this action. The Decade of Traffic Safety Plan of Action is a framework for action by all member states and communities to implement road safety management around the world. This plan was also implemented by the Republic of Serbia.

Traffic participation on public roads has become an integral and inevitable part of daily life. According to some estimates, a typical driver today spends at least two hours a day in the car, which makes up almost a third of a six-hour work day (Günther, 2005). The issue of road traffic safety is not a police problem, nor is it simply a traffic issue. Traffic injuries are, above all, a public health issue, and then a social, ethical, human and economic community issue. Namely, a great number of people die and are injured in traffic, with some remaining life-long invalids. This significantly impairs human health, destroys families, as well as creating social and humanitarian problems. Finally, the huge socio-economic cost of traffic accidents is compensated by the state economy, which hinders the economic development of the community at large.

The work environment has a greater effect on the accident rate when farm vehicles, or tractors, are involved (Blower et al., 1993). Thus, in the United States, agriculture is the most risky branch of industry for the young workforce (Centers for Disease Control, 2003). Thus, it is a known fact that overturning tractors is the leading cause of death in American agriculture (NORA AgFF Sector Council, 2008). There is no general agreement on minimum age or developmental stages when it is safe for minors to drive tractors (Lee & Marlenga, 1999), and therefore, minors driving tractors prior to gaining the required developmental and cognitive abilities are at a greater risk of trauma (Schwebel & Pickett, 2012). In the member states of the European Union (EU) overturning tractors are the leading cause of death in the agricultural sector. According to a survey conducted by the European Commission of the EU Member States, 40% of serious injuries and fatal accidents occur when a tractor overturns when a rollover protection structure (ROPS) was not applied in a protecting position (Hoy, 2009). In the region of Murcia, Spain, during the 2005-2012 period, there were 44 accidents with tractors, and in three out of four incidents, ROPS was in a horizontal position (unsafe) (Martin-Gorriz et al., 2012).

In order to present this paper, it is necessary to briefly indicate the criminal offenses against the safety of public traffic envisaged in the current Criminal Code of the Republic of Serbia (hereinafter: CC). The code which is valid from 1 January 2006, regulates the matter of criminal legislation, while the criminal offenses against the safety of public traffic are set out in Chapter 26. This group includes 9 criminal offenses. Significant for this paper are: endangering public transport (Art. 289), failure to provide assistance to

a person injured in a traffic accident (Art. 296) and serious offenses against the security of public traffic (Art. 297) in which a driver driving a tractor may appear as an offender. These are the most common criminal offenses that appear in court practice.

Although motor vehicles, after pedestrians, are the most frequent traffic participants, the numerous farming vehicles are on the roads every day. The most common farm vehicles on the roads of Serbia are tractors. Official data is also indicative of the dangers of farm vehicles, particularly tractors. Thus, the Road Traffic Safety Agency of the Republic of Serbia states that in traffic accidents which involved tractors and other farm vehicles in the 2011-2015 period, 267 persons were killed, while 2,318 persons sustained grave and light injuries, which was also revealed by electronic media (Agromedia, 2018).

The research method

The research methods used in the paper are methods of analysis, synthesis, concretization, abstraction, inductive and deductive concluding. The data presented in the paper are summarized and compared, using several different criteria. There is data comparison by region, both individually and regionally. According to six municipalities in western Serbia and in northern Serbia were selected for comparative analysis due to their specific natures and characteristics. Both regions have a large urban area, one region has crop production, and the other fruit and cattle production, as the configuration of the terrain is different. The population of both regions is fairly accurate All the above mentioned creates a relevant basis for analysis, hypothesis testing and drawing conclusions.

The Commission of the Faculty of Traffic Engineering in Belgrade has implemented the Transport Safety Strategy of the City of Valjevo for the 2016-202period (Off. Gazette of the city of Valjevo, 2017), which shows that there is no generally accepted methodology in Serbia for calculating the total socio-economic costs of traffic accidents. The methodologies applied in other countries are significantly different. Depending on the assessment model, the total socio-economic costs per affected person range from the following: 266,358 (Republika Srpska, 2012) to 3,652,265 €/CAS (New Zealand, 2014), or from 10,623 to 664,098 €/SIP and from 354 to 64,208 €/LIP. Bearing in mind the data from the mentioned strategy as well as data related to the time period that was the subject of the analysis for developing the Strategy in correlation with the data on the number of traffic accidents in Valjevo in the 2010-2015 period and the number of persons killed – 3,040 traffic accidents in which 1,521 persons were reportedly killed (killed or injured), there are two variants related to the total social and economic costs per victim. The total socio-economic costs for the victims in this six-year period were estimated from EUR 14.3 million (according to the methodology from Republika Srpska - Traffic Accident Costs in the Republika Srpska, Economic Institute, Banja Luka, 2012) to EUR 435 million (according to methodology from New Zealand), or as follows:

- The costs for 39 casualties were from EUR 10.4 million to 142.4 million.
- The costs for 329 seriously injured persons (SIP) were from EUR 3.5 million to 218.5 million, and

- The costs for 1,153 persons with light injuries (LIP) were from EUR 408,000 to 74 million.

Bearing in mind the indicators that could objectively refer to the Republic of Serbia, in our opinion, the data relating to the Republic of Srpska in relation to the other data referring to New Zealand are more acceptable. This means that in the further analysis for the reference value of economic costs, one casualty will be given the value of EUR 266,000 (10,400,000/39), and a person with serious bodily injuries EUR 10,600 (3,500,000/329).

The following hypotheses are tested in the paper:

The negative effects of traffic accidents which involve farm vehicles are manifested in multiple ways: loss of life, injury, economic damage of a farm vehicle, to negative economic effects on the farmstead due to the absence of a household member as a result of injury and through the costs of terminating the additional commercial activities of the farmstead.

By a comparative analysis of traffic accidents over a period of six years of the six municipalities of western and northern Serbia, the conclusion can be drawn that the number of tractor-related accidents is lower in the plains, which implies a less negative economic impact on the economy of farmsteads in these areas. The reasons are multiple, from the age structure of the tractor, the configuration of the terrain, the average age of the person driving the vehicle, etc.

The financial sector, primarily the insurance sector but also the relevant state institutions, should, through systemic solutions, give greater importance to the elimination of the negative traffic accident-related economic effects which involve farm vehicles, especially if they are driven by heads of farmsteads or family members who are engaged in work, with specific models of assistance to the families of those killed or injured in the period of economic recovery, which is often reduced to mere survival.

Data

According to the data of the Road Traffic Safety Agency of the Republic of Serbia in 2016, there were 35,971 traffic accidents, of which 14,401 had casualties with 607 people killed and 20,641 persons injured, out of which 3,363 persons received serious bodily injuries, and 17,278 light injuries. In the year 2016, 40 drivers and passengers were killed while driving tractors, and a total of 195 persons were injured by tractors: 80 seriously and 115 lightly. The following table summarizes the data for the 2012-2016 period. The columns contain data for six municipalities in western and northern Serbia. Data on the total number of traffic accidents, the total number of persons injured and killed on tractors, as well as the number of tractors, farms, number of spouses of household heads, number of other family members, as well as the number of farmsteads that carry out other commercial activities was given, so that there is a comparison of municipalities as well as regions. The data on the farmsteads were taken from the 2012 Agricultural Census of Agriculture.

Table 1. A comparative presentation of traffic accidents and farmsteads–the municipalities of western and northern Serbia 2012-2016.

	Valjevo	Lajkovac	Ub	Osečina	Mionica	Ljig	Subotica	Senta	Bačka Topola	Kanjiža	Mali Iđoš	Ada
Total no. of traffic accidents with injured and casualties	945	182	379	77	168	130	1057	188	197	155	91	132
Total no. of persons injured	1199	262	543	91	246	194	1505	213	309	227	142	161
Number of persons injured on tractors	27	21	38	4	23	7	24	4	21	10	1	11
Total number of casualties	43	13	19	6	14	12	37	9	19	19	4	7
Total number of casualties on tractors	4	4	0	3	4	3	0	1	1	0	0	1
Total number of tractors	5333	1631	4223	1849	2453	2011	4945	1617	2635	2658	711	1282
Number of family farmsteads	8755	2570	5977	3628	3432	3099	6542	1770	3378	2853	1303	1603
Spouses of farmstead heads (female)	4471	1436	3202	2076	1843	1629	2806	736	1326	1339	574	633
Number of family members and relatives of farmstead heads	7607	1946	5164	3350	2840	2447	3118	723	1322	1238	517	547
Farmsteads carrying out other commercial activities	2024	173	823	626	849	842	445	101	171	209	81	107

Source: Road Traffic Safety Agency, RS, and NSSO (2012-2016).

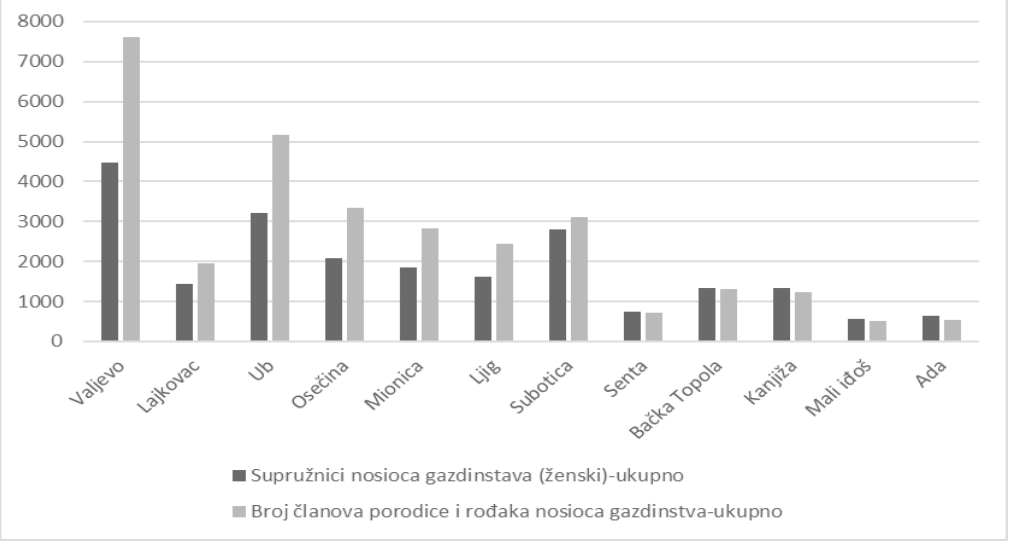
If we compare the mentioned municipalities, we can notice that the greatest number of traffic accidents with casualties is on the territory of Subotica. If the number of injured persons is analyzed, Subotica and Valjevo had the largest number in the mentioned period, which is understandable considering the number of inhabitants.

Regarding the data collected for the municipalities of western and northern Serbia, we can note that the number of injured persons driving tractors in the 2012-2016 period in western Serbia is 55% higher, while the number of casualties is 6 times higher than in northern Serbia.

The total number of family farmsteads in the municipalities of western Serbia is 27,461, while for it is 17,449 in the northern Serbian municipalities, and when these data are compared with the total number of tractors in the six mentioned municipalities, we can draw the conclusion that there are 1.57 tractors for every one farmstead in western Serbia, and for the municipalities of northern Serbia - 1.26 tractors. We can conclude that according to the number of tractors per family farmstead, western Serbian municipalities are in the lead, which can have an impact on the number of persons injured in tractor-related accidents in comparison with the municipalities of northern Serbia, but also with the Serbian average.

In order to better understand all the economic aspects of tractor-related accidents, data on the number of female spouses as well as data on other family members on farmsteads in the municipalities listed in the previous table was analyzed. The total number of these persons for the municipalities of western Serbia was 38,011, and for the municipalities of northern Serbia - 14,879. When the data are compared with the number of family farmsteads, we can draw the conclusion that for every farmstead, there are 1.38 persons from the category of spouses of the household heads or other family members in the municipalities of western Serbia, while that number is 1.17 persons for northern Serbia. The conclusion is that municipalities in western Serbia have farmsteads and larger families. If we assume that the persons injured and killed in tractor-related accidents are working household members and often, the farmstead heads, the previous data shows that in the case of accidents in the municipalities of western Serbia, a greater number of persons living on family farmsteads can be considered vulnerable, as they are left to manage the farms.

Figure 1. Graphic representation of the number of spouses of household heads and number of family members.



Source: SORS-2012 Agricultural census

Particularly interesting is the data on the number of farmsteads that carry out other commercial activities, besides the basic one. There are 5.337 or 19.4% of such farms from the total number of farmsteads in western Serbia, and in the north only 1.114 or 6.3%. This points to the conclusion that family farmsteads in the mentioned northern municipalities are more focused on basic agricultural activities. The somewhat higher "enterprising spirit" of family farmsteads in western Serbia, manifested by a number of additional activities, can be additionally put at risk by the above-mentioned number of traffic-related accidents in this area. It is difficult to make a precise assessment of the negative economic effects on these additional activities, but they without doubt imply an disruption of activity, the inability to meet financial obligations and, of course, a lack of profit.

Discussion of results

The following table shows the data related to the indicators in the first table, that is, the percentage of persons injured and killed in tractor-related accidents in relation to the total number of persons, the indicator of the age of the tractor, and the percentage of farmsteads that carry out other activities, according to municipalities.

Table 2. Results of comparison – western and northern Serbia municipalities.

2012/2016	Valjevo	Lajkovac	Ub	Osečina	Mionica	Ljig	Subotica	Senta	Bačka Topola	Kanjiža	Mali Iđoš	Ada
% of injured in tractor-related accidents compared with the total number of injured	2	8	7	3	8	4	2	2	7	4	1	7
% of casualties on tractor-related accidents compared with the total number	9	31	0	50	29	25	0	11	5	0	0	14
% of tractors older than 10 years	96.6	96.7	95.5	95.4	95.5	96.6	87.8	90.2	89	92.4	87.4	88.9
% farmsteads where other commercial activities are carried out	23.1	6.7	13.8	17.2	24.7	27.2	6.8	5.7	5.1	7.3	6.2	6.7

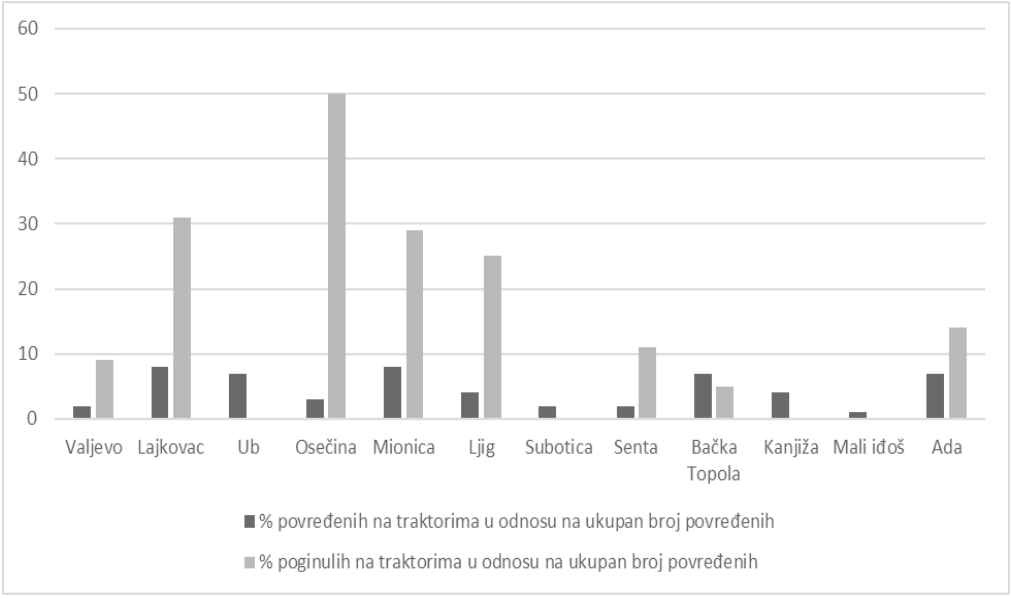
Source: SORS-Agricultural census, 2012.

The percentage of injured persons on tractor-related accidents in relation to the total number of injured persons is the highest in Lajkovac and Mionica - 8%, followed by the municipalities of Ada and Bačka Topola - 7%, and the fewest in the municipality of Mali Iđoš - 1%. According to the Road Traffic Safety Agency in 2016, the percentage

of injured persons on tractor-related accidents (195) in relation to the total number of casualties (20,641) in the Republic of Serbia is 0.94%. According to this indicator, all the listed municipalities are far above the national average, which is also explained by the fact that the number of injured persons is augmented by injuries from urban areas, where there are much fewer farm vehicle accidents than in the analyzed municipalities.

As regards the percentage of casualties in tractor-related accidents compared to the total number of casualties, the Osečina municipality, where half of the casualties were involved in tractor-related accidents, was on the top of the list, followed by the Lajkovac municipality with 31%, Mionica 29%, and Ljig 25%. Of the analyzed municipalities in northern Serbia, a slightly higher percentage of casualties in tractor-related accidents in comparison to the total number of casualties occurred in the municipality of Ada - 14%. According to the Road Traffic Safety Agency 2016 data, the percentage of casualties in tractor-related accidents compared to the total number of casualties in the Republic of Serbia was 6.59%. The conclusion is that apart from Ub, all the analyzed municipalities of Western Serbia significantly exceeded the national average. In the north, this is valid for the municipalities of Senta and Ada. The preliminary analysis is shown in the graph below.

Figure 2. Graphical representation of the percentage of casualties on tractor-related accidents compared to the total number.



Source: Road Traffic Safety Agency 2012-2016.

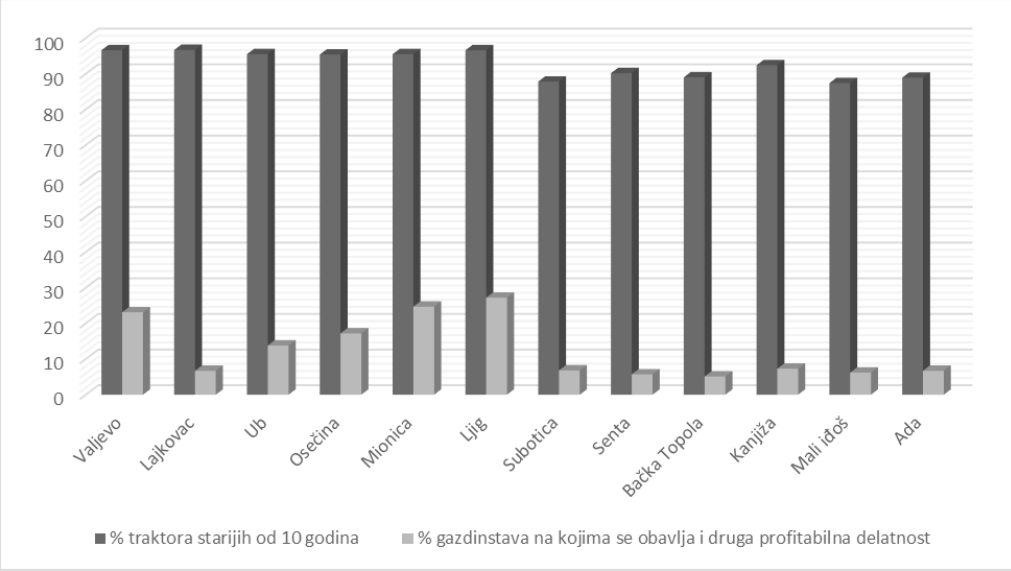
The age group of the casualties according to the Road Traffic Safety Agency in the analyzed period in the municipalities of western Serbia is over 46 years old, while for northern Serbia, the average age ranges from 15 to 46, except for Senta and Bačka Topola where the casualties were mostly in the 46-64 age group.

The quality of farm vehicles and their reliability is defined by their age in Serbia. Although the market for farm vehicles in the first nine months of 2017 recorded a sales growth of around 50% compared to 2016, with the greatest increase in the tractor market, despite the purchase of new technology, the average age of tractors continues to be 25 years (www.poljoprirednik.net, 2018).

Regarding the areas of western and northern Serbia, which are the subject of this research, we have established that the percentage of tractors older than 10 years is the highest in Valjevo and the Lajkovac region, close to 97%, while in the Subotica area, as well as in the municipalities of Ada and Mali Iđoš, this percentage is somewhat lower, about 89% of the total number of tractors. Thus, the analyzed municipalities of western Serbia have farmsteads with only 4% of tractors under the age of 10, while in the north this number is about 10%. The use of such old mechanization in the hilly regions certainly increases the risk of traffic accidents, but also explains the actual economic power of the average farmstead.

The percentage of farmsteads carrying out other commercial activities is the highest in the municipalities of Ljig and Mionica, and the lowest is in the municipalities of Senta and Bačka Topola. The conclusion is that the farmsteads in the analyzed municipalities of western Serbia are somewhat more enterprising compared to the north, while the analyzed municipalities in the north have a smaller percentage of older (and thus, more risky) tractors. Below is a graphical presentation.

Figure 3.Graphical representation of the percentage of tractors older than 10 years and farmsteads which carry out other commercial activities 2012-2016.



Source: Road Traffic Safety Agency 2012-2016.

In the calculation of the economic effects of tractor-related traffic accidents in the mentioned municipalities, we will use data on costs for road traffic victims, which we analyzed in the first part of this paper, which are EUR 266,000 per victim, i.e. EUR 10,600 per person with physical injuries. We can conclude that in the observed period, in the municipalities of western Serbia, 18 people died in tractor-related accidents, which corresponds to an "economic cost" of EUR 4,788,000, while for northern municipalities, this amount was EUR 798,000 for the same period. Given the fact that there is no data if all of them were household heads but assuming they were (or a majority of them), opportunity costs should be included in the calculation of the negative economic effects, which actually indicates a loss of profit due to a standstill or a reduced volume of farm business caused by traffic accidents. The opportunity cost differs according to farmstead, production volumes, whether the person involved was the only worker on the farmstead, if the tractor was used actively on the farmstead, etc. If these data were available, a more detailed economic analysis and calculation of summarized economic effects could be made, but due to lack of data, we fall short of expectations.

Conclusion and recommendations

Based on the preliminary analysis, we can conclude that tractor-related traffic accidents have multiple adverse effects, which are manifested not only in the loss of human lives and injuries, but also a series of negative economic effects pertaining to farmsteads and their members who participated in the accidents.

A comparative analysis of the data leads to the conclusion that the negative economic effects of these accidents in the 2012-2016 period were higher on the territory of the six analyzed municipalities of western Serbia, compared to the municipalities of northern Serbia according to the criteria of the number of casualties, but also the damages criteria, and the opportunity costs incurred by loss of profit due to a standstill or decrease of commercial activities. The above conclusions essentially confirm the first hypothesis of this paper, as well as other hypotheses.

The average age of the vehicle, the age of the drivers, the number of tractors, and the configuration of the terrain increase the risks of traffic accidents and the mentioned negative effects, which are somewhat lower in the municipalities of northern Serbia compared to the municipalities of western Serbia.

It is recommended that the financial sector, first and foremost the insurance sector, is to actively engage in solving this problem through systematic solutions to support the farmstead families of the victims, with the support of the competent state institutions. The fact is that there is insufficient focus on the negative economic effects caused by farm vehicle-related traffic accidents, primarily tractors, especially if they were driven by household heads or working family members. The damage, as the paper proves, is calculated in millions of Euros only in the two analyzed regions, while the figure in the territory of the Republic of Serbia is much higher.

In fact, there are no systematic, concrete models for helping the families of the casualties and those injured during the period of economic recovery. The availability of insurance

policies, better information, and wider support in difficult periods for farmsteads can be crucial for overcoming such problems, which, often due to all the negative effects mentioned, are reduced to the perils of existence and unrelenting survival.

Conflict of interests

The authors declare no conflict of interest.

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MODERN FOOD RETAIL AND UNFAIR TRADING PRACTICES

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A B S T R A C T

The abuse of bargaining power by retailers is reflected in unfair trading practices (UTPs) and there has been a growing interest among EU MSs to address them using regulatory approach and self-regulatory initiatives among market participants. The experiences of ex-YU and neighboring EU MSs are of interest for Serbia. Serbian food suppliers are not protected from UTPs apart from general competition and contract rules and payment terms regulation. Therefore, after a brief review of the global food retail trends and the role of power in the supply chain management in the introduction, the discussion focuses on UTPs and regulatory mechanisms to address them at the EU level, in selected EU MSs and in Serbia. Regarding existing EU and MS practices, it is recommended that Serbia introduce specific UTP regulation in the food supply chain and authorize the Commission for Protection of Competition for the enforcement.

Introduction

Modern food retailers have become more consolidated and concentrated and dominate food sales in developed countries. Highly competitive environment forces these companies to be more efficient and to expand their presence abroad, so their sourcing and outsourcing strategies become an important determinant of the integration of the world economy (Stamm, 2004).

According to Deloitte's Global Powers of Retailing Report, in FY2015 there are 133 FMCG (fast-moving consumer goods) retailers among world's Top 250 retail companies, accounting two-thirds of their total retail revenue (Deloitte, 2017). These

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retailers operate on average in 5.9 countries and earn 21.5% of retail revenue abroad. Six of the global Top 10 retailers in 2015 were FMCG companies with hypermarket/ supercenter/superstore and discount store operational formats (Wal-Mart, Kroger, Schwarz, Carrefour, Aldi and Tesco) and their share in FMCG Top 250 retail revenue accounted for 21.7%. The Carrefour operates in 35 countries, Wal-Mart in 30, Schwarz in 26, Aldi in 17, etc.

In the late 1990s a wave of mergers and acquisitions in the supermarket sector was registered (Brown, Sander, 2007). This process continues throughout the 2000s and in 2016 was marked by the merger of the Koninklijke Ahold N.V. (the Netherlands) and Delhaize group SA (Belgium) to form Ahold Delhaize, one of the world's largest food retailers (Deloitte, 2017).

The share of the five largest operators (C5) on the total edible grocery markets in all large EU MSs, except Italy, lies in range of 40% to 60% (Chauve et al., 2014). According to the latest sector inquiry into the food, beverages and tobacco retail market in the Republic of Serbia, prepared by the Commission for Protection of Competition, the share of the five largest retailers in the total retail revenue in 2016 was 46.82%, with the dominant role of the two leading retailers - Delhaize Serbia (20.60%) and Mercator (15.98%). It is expected that the German Lidl soon after entering the market (2018, October) will have 5-7% market share and a third position, with good prospects for further growth (CPC, 2018).

Starting from the standpoints that supply chains compete, not companies (Christopher, 2005; Li et al., 2006) and that an effective supplier partnership can be a critical component of a leading edge supply chain (Noble, 1997), large grocery retailers take over the leading role in supply chain management - undertake new procurement systems and private quality and food safety standards (Reardon et al., 2004), adopt efficient consumer response practices (Van der Vorst, 2000) and develop private labels with higher profit rates as a result of economies of scale, developing the production itself and creating responsive customer-driven supply chains (Wortmann, 2010; Kotler, Keller, 2012).

Power represents one of the major elements of the supply chain management (Belaya, Hanf, 2016). Different sources of power (coercive, reward, legitimate, expert, referent, informational) have contrasting effects upon inter-firm relationships and chain performance (Maloni, Benton, 2000; Liu et al., 2010; Belaya, Hanf, 2016). Buyer power is globally defined as the ability of a buyer to influence the terms and conditions on which it purchases goods. A retailer has buyer (bargaining)[4] power if in relation to at least one supplier it can credibly threaten to impose a long-term opportunity cost (harm or withheld benefit) which, were the threat carried out, would be significantly disproportionate to any resulting long-term opportunity cost to itself (OECD, 1998).

4 Buyer power and bargaining power are not substitutable concepts under European competition law. Unlike buyer power that can affect the whole market, bargaining power affects only a bilateral relationship of the parties concerned (Chauve et al., 2014).

According to Hernández-Espallardo and Arcas-Lario (2003), in the context of asymmetrical channel partnerships dominated by a downstream leader, authoritative mechanisms of coordination lead to improvements in market orientation of the upstream followers. Cox (2001) founds that buyer power, based on buyer dominance or buyer-supplier interdependence typical for food retailing, distinguishes itself as an effective tool in proactive supply development.

Supplier satisfaction, defined as the feeling of equity with the supply chain relationship no matter what power imbalance exists, is a potential source of supply chain competitive advantage and therefore it should have an important role in supply chain integration strategies (Benton, Maloni, 2005). However, necessity of maintaining a preferred supplier status, particularly in cases of inelastic supply, assets specificity and high switching costs, moderate supplier countervailing actions and creates opportunities for buyer power abuse (Renda et al., 2014; Fałkowski, 2017).

Materials and methods

The review of the global food retail trends was carried out using Deloitte's Global Powers of Retailing Report. Several scientific papers and projects' reports and surveys examining the role of power in the supply chain management and the effects and costs of unfair trading practices in food retail is consulted and quoted. The analysis of unfair trading practices and regulatory mechanisms to address them at the EU level and in selected EU MS and in Serbia are mainly based on official documents and reports of relevant national and EU institutions and on national and EU legislation. During the discussion and formulation of conclusions and recommendations, the analytical-synthetic method was used.

Results and Discussion

Unfair trading practices in the food retailer – supplier relationships

The abuse of bargaining power by retailers[5] is reflected in unfair trading practices (UTPs). The UTPs are defined as practices that grossly deviate from good commercial conduct, are contrary to good faith and fair dealing and are unilaterally imposed by one trading partner on another (EC, 2014).

The key categories of UTPs can be described as follows: 1) unduly or unfairly shift of costs or entrepreneurial risks to the other party, 2) asking the other party for advantages or benefits of any kind without performing a service related to the advantage or benefit asked, 3) making unilateral and/or retroactive changes to a contract, unless the contract specifically allows for it under fair conditions and 4) unfair termination of a contractual relationship or unjustified threat of termination of a contractual relationship (EC, 2016).

In the case of British food retail, the most frequently recorded breaches of the Groceries Supply Code of Practices (GSCOP) include delayed payments, demands for lump sums for product stocking and demands for payment for better positioning on shelves

5 UTPs can occur along the supply chain, but here the focus is on retailers' UTPs against suppliers.

(McClean, 2016). Suppliers have been forced to pay for better shelf positioning or "seen money simply disappear from their trading accounts" (Moulds, 2015).

The following UTPs are on the List of bad practices in the food supply chain of the Ombudsman for relations in the food supply chain in Slovenia: payment delays, contractual restrictions on charging interest on late payments, franchising at noncompetitive prices, limitation of the right of suppliers to change prices upwards, return of purchased and received goods, transferring marketing activities to suppliers, unfair contractual penalty for non-delivery of goods and delay in delivery even due to force majeure, unwritten buyer's requirement for lowering the purchase prices, transferring transport and storage costs to suppliers, slotting fees, introductory allowances, shrinkage fee and extra rebates, buyer's recommendation to the supplier to sign a contract with a money transfer company, not agreed prepayment and cash discount billing and additional billing for the sale of receivables (Podgoršek, 2015).

Among the UTPs recorded in the Croatian retail sector are: restricted access to the market, advance payment for accessing negotiation, listing fee, slotting allowances, forced involvement in promotions, payment delays, unilateral and retroactive changes to contract terms, buyer's requirement to the supplier to purchase packing materials from the specified operators, payment for not reaching certain sale levels, unilateral withdrawal of the product from the shelf, unconditioned return of unsold merchandise, etc. (Kelava, 2017).

The most common UTPs registered in the Hungarian distribution of agricultural and food products in 2010-2015 by The National Food Chain Safety Office were: use of fixed bonus, late payments, higher discount rates and long-term supplier's consent, passing on the costs of actions benefiting the trader to the supplier, prohibited use of background conditions and unfair practices concerning business rules (Velő, Bors, 2015).

Several Romanian retail chains were registered in using framework contracts on which they would not intervene in case of objections, requiring an annual change of the contractual terms often increasing suppliers' charges, delaying payments, delisting in an unreasonable way, blocking orders procedure or a supplier deliveries without refund of the entry or listing fees, imposing unconditional return of unsold merchandise, etc. (RCC, 2013).

There are many forms of "unfair coercive" conduct without economically objective justification in Bulgarian FMCG sector, in particular unjustified refusal to supply or purchase goods or services, subjecting a contractual partner to unjustified or discriminatory obligations or trading conditions and unjustified severance of established business relations (Petrov, 2015).

Agriculture in Serbia has been the biggest creditor of retail chains for years. Small and medium-sized enterprises are particularly affected by the high listing fees. Large FMCG manufacturers are also faced with payment delays and a range of discounts and charges − special promotion discount, warehousing inventory discount, shrinkage fee, listing fee, fee for stock to fill the shelves of new stores, etc. Among the special commercial

terms contracted as an expression of the buyer power are marketing costs, approval of a permanent loan to the buyer and cash discounts for prepayment. In addition to extra rebate for sale above a certain level, suppliers are demand to pay a year-end rebate (Drašković, Domazet, 2008).

In the CIAA & AIM EU-wide survey (2011) among intermediate FMCG processors, 96.4% of the respondents said they had been subject to at least one form of UTPs in 2009. The reported cost of these UTPs represents 0.5% of the turnover of companies surveyed (CIAA-AIM, 2011). According to a 2013 Dedicated Research for COPA-Cogeca, 94% of farmers and 95% of agri-food cooperatives report having been exposed to at least one UTP. The estimated damage from UTPs amounted to EUR 10.9 billion per year (EC, 2018a).

The lack of market transparency caused by UTPs leads to increased risk and uncertainty and squeezed margins with potentially negative effects on supplier investment and innovation capacities. Consumers may face loss of choice in short term, higher long-run prices and fewer new products, with potential knock-on effects on range and quality (Consumers International, 2012). However, it should be emphasised that the understanding of the impacts of UTPs (as well as of the effects of legal responses to UTPs) is still very limited and ambiguous (Fałkowski, 2017).

UTP regulatory and enforcement frameworks

The most significant UTPs related to contract breaches are covered with national contract law. Some EU MSs, like Germany, extended the application of Unfair Terms Directive (Council Directive 93/13/EEC on unfair terms in consumer contracts) towards B2B contracts (Renda et al., 2014; Glöckner, 2017). Excessive payment periods and late payment are tackled by the Directive 2011/7/EU on combating late payment in commercial transactions.

European competition law does not address the abuse of bargaining power in the zone below market dominance but Member States may, under Regulation (EC) No 1/2003 on the implementation of the rules on competition laid down in Articles 81 and 82 of the Treaty, implement national legislation that prohibits or imposes sanctions on UTP acts, be they unilateral or contractual. Therefore, some EU MSs address the abuse of economic dependence or superior bargaining power within the extension of competition law (Renda et al., 2014; Glöckner, 2017; Cafaggi, Iamiceli, 2018).

The Directive 2005/29/EC concerning unfair commercial practices in B2C relationships (Unfair Commercial Practices Directive - UCPD) enables the extension to B2B relationships at national and EU level.

National private regulatory schemes often reflect the European private regulatory instruments, such as the European principles of good practice in vertical relationships in the food supply chain (2011), implemented and enforced by the Supply Chain Initiative (SCI), agreed in 2013 by 11 EU-level organisations, including Copa-Cogeca, and its national platforms (The SCI, 2018).

According to data from the Commission's 2018 Impact Assessment, 20 EU MSs have specific legislation on UTPs, four MSs have legislation of a limited scope (based on a consumer-type approach), and four MSs have no UTP legislation. Legislative instruments specifically applicable to the food supply chain were adopted in 12 EU MSs whereas in 8 MSs the UTP legislation is applicable to all sectors (though sometimes including specific provisions on food and groceries trade practices, e.g. in France, Latvia and Portugal) (*Table 1*.):

Table 1. EU MSs by UTP legislation

	Total	EU MSs
NO LEGISLATION ON UTPs	4	Estonia, Luxembourg, Malta, The Netherlands
LIMITED SCOPE LEGISLATION (mainly consumer-type UTP approach)	4	Belgium, Denmark, Finland, Sweden
SPECIFIC LEGISLATION ON UTP:		
CROSS-SECTOR, applicable:		
– along the supply chain	7	Austria, Cyprus, France, Germany, Greece, Latvia, Portugal
– towards retailers only	1	Lithuania
IN THE AGRI-FOOD SECTOR, applicable:		
– along the supply chain	8	Bulgaria, Croatia, Italy, Poland, Romania, Slovakia, Slovenia, Spain
– towards retailers only	4	Czech Republic, Hungary, Ireland, United Kingdom
TOTAL	28	

Source: Cafaggi, Iamiceli, 2018.

Considering the enforcement, many EU MSs, in addition to judicial enforcement and private dispute resolution mechanisms, designated an administrative enforcement authority with investigatory powers - ex officio or on the basis of parties' complaints[6] and sanctioning powers, including fines and, to a limited extent, injunctions (Cafaggi, Iamiceli, 2018).

The UK is among the leaders in the enforcement of rules against UTPs between retailers and their direct food suppliers. The Groceries Code Adjudicator, established by the Groceries Code Adjudicator Act (2013), enforces the Groceries Supply Code of Practice (GSCOP) set out in Schedule 1 to the Groceries (Supply Chain Practices) Market Investigation Order 2009, which regulates practices between designated UK retailers, with annual turnovers of more than £ 1 billion and their direct suppliers. The Adjudicator is able to investigate ex officio on the basis of parties' complaints, arbitrate disputes, make recommendations and fine designated retailers for breaching the GSCOP. The UK System has been mutually recognized with the EU SCI in June 2013 (The SCI, 2018). The Unfair Contract Terms Act (No. C. 50/1977) regulates unfair contract terms in B2C & B2B relations and is enforced by the courts.

6 Many administrative enforcers allow anonymous complaints but preserve the discretionary power to start investigations.

The ex-YU and EU MSs - the neighbors of Serbia were also regulated UTPs in food supply chain by a specific agri-food legislation, in addition to the existing provisions of general legislation and its extensions.

The Slovenian Agriculture Act (No. 45/08, 57/12, 90/12 – ZdZPVHVVR, 26/14, 32/15, 27/17, 22/18) defines UTPs as practices by which one party with its significant market power reflected in the volume or value of sales, contrary to good business practices exploits the other party, lists some of them and specifies that the contract is legally void in the part containing such provisions. The Agriculture Act introduces the institute of the Ombudsman for relations in the food supply chain. The Ombudsman is in charge for notification of UTPs to the Competition Protection Agency. The Agency is responsible for the supervision and imposition of fines in the minor offence procedure. Some UTPs are covered by unfair competition provisions of amended Prevention of Restriction of Competition Act (No. 76/15) and enforced by the court.

The Croatian Law on the prohibition of unfair trading practices in the B2B food supply chain (No.117/2017) prohibits purchasers and/or processors or traders to abuse significant bargaining power, reflected in the total annual turnover, in relations to their suppliers. The Law lists UTPs and authorises the Competition Protection Agency to initiate the procedure ex officio and at the request of the party, detect breaches, assess voluntary commitments and issue injunctions and fines. The Law on Financing and Pre-bankruptcy Settlement (No. 108/12, 144/12, 81/13, 112/13, 71/15, 78/15) contains a blacklist of unfair contractual terms and is enforced by the court.

The Hungarian Act No. XCV of 2009 on the Prohibition of Unfair Distributional Practices Applied Towards Suppliers with regard to Agricultural and Food Products prohibits unfair distribution practices of traders, regardless of their market power, against suppliers of agricultural and food products and lists the practices considered to be unfair. Traders whose annual net revenues exceeded 20 billion HUF are obliged to prepare and publish their business rules and submit them to the National Food Chain Safety Office. The National Food Chain Safety Office has competence to collect confidential complaints, launch ex officio investigations, decides on commitments and impose sanctions.

In Romania, The Law 321/2009 on marketing of food products amended and supplemented by the Law 150/2016 incorporates the Code of conduct for the trade of agro-food products (2008) and mostly refers to the prohibition on traders to request invoicing/re-invoicing and charge suppliers for taxes and services, delisting and terms of payment. The National Consumer Protection Authority and the Ministry of Finance launch ex officio investigations and impose fines.The abuse of economic dependence is addresses by the Competition Law 21/1996 and enforced by the Competition Council.

The Law on Amendment and Supplementation of the Bulgarian Law on Food (No. 56/2015) prohibits a range of UTPs and establishes the Reconciliation Commission with the aim to settle out-of-court disputes between food producers and traders. The Law on Amendment and Supplementation of the Law on Protection of Competition (No. 56/2015)

prohibits the abuse of superior bargaining position (determined by the market structure and B2B relationship specificities) along the supply chains and provides a non-exhaustive lists of abusive practices. The Commission on Protection of Competition is entrasted to launch proceedings initiated by the affected parties as well as ex officio proceedings, following the procedure for unfair competition cases and issue injunctions and fines.

The Serbian Law on Protection of Competition (OG RS, No. 51/09, 95/13) does not go beyond the scope of EU competition law. The Law on Obligations (OG SFRY, No. 29/78, 39/85, 45/89, 57/89; OG FRY, No. 31/93; OG S&M, No.1/03) provides a general reference to the principles of good faith and fair dealing and rules for the obligatory relations, including general conditions of standard clause contracts. Late payments are tackled by the Law on deadlines for settlement of financial liabilities in commercial transactions (OG RS, No. 119/12, 68/15, 113/17).

The divergence of EU MS regulatory approaches to UTPs may lead to differences in the conditions of competition. The fear factor discourages the weaker party from taking legal action through courts. The enforcement and confidentiality issues are the main concerns related to the effectiveness of self-regulatory platforms in tackling UTPs. There is also very little coordination among MS enforcement authorities, due to the absence of formal coordination structures at EU level (EC, 2018a). These are the reasons why the UTP regulatory and enforcement frameworks is constantly changing, improving and harmonizing at the national and EU level.

Future directions in UTP regulation

Regulation of transboundary phenomena, overcoming divergence in UTP rules between the MSs, transaction cost savings and economies of scale in administration are listed as the main benefits of EU-wide UTP legislation. On the other hand, there are harmonisation and switching costs of such specific legislation that will be considerable, as well as the issues of over-regulation and further fragmentation and incoherency of the EU aquis (Swinnen, Vandevelde, 2017; Hilty et al., 2013).

According to Glöckner (2017), the application of contract law supplemented by an extension of Unfair Terms Directive to B2B contracts may afford appropriate protection against most types of post-contractual UTPs in supply chain. Competition law should be extended with regard to exclusionary practices of undertakings with less than absolute dominance. Unfair competition law can be used to address exploitative abuses in vertical relationships not covered by the contract or contractual declaration of intent (except in the situations of market dominance). Directive on unfair trading practices, drafted in general and large in parallel with the UCPD, should encompass both upstream and downstream commercial practices and include the prohibition of misleading advertising directed at nonconsumers.

Swinnen and Vandevelde (2017) suggest establishing a centralised adjudicator at EU level for aggregating confidential complaints from across the EU and refering them to national enforcement authority for proceedings and sanctions.

In 2017, after almost a decade of consideration of these issues, the Commission launched an inception impact assessment, which offers a set of policy options for UTP regulation in the food supply chain:

1) the status quo,
2) EU-wide non-legislative guidelines and recommendations,
3) EU framework legislation relating to only a few specific manifestly UTPs prohibited and stakeholders concerned, to complement national legislation and the SCI, in line with the approach outlined in the AMTF's report (2016),
4) minimum EU framework legislation relating to common general criteria at the chain level for MSs to determine UTPs, help stakeholders draw up a code of conduct and make the compliance with this code mandatory.

Legislation could further contain binding minimum criteria for national enforcement (EC, 2017).

After wide stakeholder consultations consolidated in the impact assessment report (EC, 2018a), the Commission launched a proposal for the Directive on unfair trading practices in B2B relationships in the food supply chain (EC, 2018b), with a restricted approach, complementary to stricter national UTP rules and voluntary codes, to tackle only a few particularly damaging UTPs in order to introduce a minimum common protection standard relating to UTPs for small and medium-sized farmers and SME suppliers in the food supply chain as regards their sales to non-SME buyers.

The UTPs that would be prohibited are: late payments for perishable food products, last minute cancellations of orders of perishable food products, unilateral and retroactive changes to the terms of the supply agreement and forcing the supplier to pay for wasted products. The UTPs that would be prohibited unless agreed in clear and unambiguous terms at the conclusion of the supply agreement are: a buyer returning unsold food products to a supplier, a buyer charging a supplier payment for the stocking, displaying or listing food products, a supplier paying for the promotion of food products sold by the buyer and a supplier paying for the marketing of food products by the buyer.

Member States are required to designate a public authority in charge for the enforcement while the Commission will set up a coordination mechanism between the enforcement authorities for the exchange of best practices. Suppliers established outside the Union should be able to rely on the EU minimum standard when they sell food products to buyers established in the Union to avoid unintended distorting effects. The Directive is expected to enter into force in 2020 (EC, 2018b).

Although faced with UTPs in relationships with large retail chains, Serbian farmers and food manufacturers are reluctant to address the court and discuss the violation of their rights within the chain because of the fear factor. Having in mind the above-considered EU MS practices and the Commission's proposal for UTP regulation, it may be recommended that Serbia introduce a specific UTP regulation in the food supply chain, harmonized with the EU UTP rules and authorize the Commission for Protection of Competition for its enforcement.

Conclusions

Modern food retailers have become more consolidated and concentrated and dominate food sales in developed countries. The abuse of bargaining power by retailers is reflected in unfair trading practices. Although the understanding of UTPs impacts on suppliers, consumers and social welfare is still limited and ambiguous, there has been a growing interest of most EU MSs to address them at national and EU level using regulatory approach and voluntary, self-regulatory initiatives among market participants. Serbian farmers and food manufacturers are faced with a range of UTPs in their relationships with large retail chains but are unwilling to address the court because of the fear factor. Having this in mind as well as existing EU MS practices and the Commission's proposal for UTP regulation, Serbia should introduce specific UTP regulation in the food supply chain, harmonized with the EU UTP rules and authorize the Commission for Protection of Competition to monitor, collect confidential complaints, launch ex officio investigations and impose fines.

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Conflict of interests

The authors declare no conflict of interest.

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LEGAL PRINCIPLES OF ORGANIC PRODUCTION IN UKRAINE: REALITIES AND PROSPECTS

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A B S T R A C T

The purpose of the article is to consider the prospects of Ukraine concerning attraction of foreign investments into production of organic products. Formal-legal, materialist dialectics and comparative-legal methods are used. The attention is focused on the subjects of legal relations concerning organic production, in particular, on joint ventures with attraction of foreign capital, the stages of certification regarding the production of organic products. The temporary restrictions on the possession of agricultural land in some EU countries and in Ukraine have been analyzed. A comparative analysis of land lease institutions and the right to use another's land for agricultural needs (emphyteusis) has been carried out.

Introduction

In modern conditions, in many countries of the world, including Ukraine, an active transition to ecologically oriented agriculture of organic production is taking place (Ignatenko, 2017). Organic production is an integral system of food production and management that combines best practices in terms of environmental conservation, biodiversity, conservation of natural resources, the application of high standards of proper maintenance (welfare) of animals, and a production method that meets certain requirements before products made using substances and processes of natural origin.

World volumes of organic food production are continuously increasing, as well as the area under cultivation of crops on organic basis. Also, the number of organic agricultural producers around the world is increasing. According to the estimates of the International Federation of Organic Agricultural Movement the number of producers of organic products has increased 10-fold from 0.2 million in 1999 to 2.3 million in 2016. More

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than 75% of all manufacturers are concentrated in Asia, Africa and Latin America. And the countries with the largest number of them are India (835000), Uganda (210352) and Mexico (210000). In 2016 nearly 57.8 million hectares of land in the world are occupied by organic production. In 1999 there were only 11 million hectares of organic agricultural land. The largest areas are concentrated in Australia - 27.1 million hectares. In the European Union, the area of land occupied by organic production is 13.5 million hectares. The global consumer market for organic products is estimated at about $ 89.7 billion and is characterized by a steady growth trend (compared to 2000 - $ 17.9 billion) (International Federation of Organic Agricultural Movement, 2017).

In the countries of the European Union, whose membership Ukraine wants to receive, the number of farms that grow and sell organic products has significantly increased in recent years. Despite the rather high potential of organic agricultural production on fertile Ukrainian lands, in Ukraine production of such products is still in its early stages of development. At the same time, in recent years there has been a steady trend towards increasing the number of organic farms. Organic production is one of the most dynamic sectors in the Ukrainian agro-industrial complex.

According to statistics, the domestic consumer market of organic products in Ukraine is estimated at 18 million euro, the export potential of the organic sector is estimated at 50 million euro. As of 2017, the number of operators in the organic market has reached 400, compared to 2016, the number of which reached only 284 (Ministry of Agrarian Policy and Food of Ukraine, 2017). This indicates the popularization of organic production in Ukraine. Today there are 16 certification companies-non-residents in the country, which carry out certification of agricultural production according to the rules of organic production, adopted in accordance with the EU Regulation No. 834/2007. The main types of organic products that are produced and consumed in Ukraine are: fruits, vegetables, cereals, meat, bakery products, baby food and dairy products. Exports of this product are made to the countries of the European Union in particular, Germany, Austria, Poland, Italy, France, the Netherlands, Denmark, as well as Switzerland, the USA, Canada.

Materials and methods

The methodological basis of the study was a complex of philosophical (materialist dialectics) and special legal (formal-legal, comparative-legal) methods of scientific knowledge. The method of materialistic dialectics allowed considering agrarian relations on the creation of organic agricultural products in development and in connection with its normative mediation. The formal legal method made it possible to identify the content of regulatory requirements in the field of organic production. The application of the comparative legal method has made it possible to compare the norms of the national legislation of Ukraine with regard to the production and introduction into circulation of organic products (raw materials) with the legislation of certain foreign countries, the EU and international legal acts.

The empirical basis for the study was the laws, regulations of Ukraine and other countries on the production of organic products (raw materials), as well as the EU Commission regulations and other international legal acts in this sphere. In, particular, the state policy of Ukraine in the sphere of organic agricultural production is determined by the system of the following strategic regulatory acts, namely: the Constitution of Ukraine, the Law of Ukraine "On the basic principles (Strategy) of state environmental policy of Ukraine for the period till 2020"; the Strategy for the development of the agrarian sector of the economy for the period till 2020; the Strategy for sustainable development "Ukraine 2020"; the Concept of the state target program for the development of the agrarian sector for the period till 2020 etc.

At the same time, the Law of Ukraine "On the production and circulation of organic agricultural products and raw materials", the Resolution of the Cabinet of Ministers of Ukraine "On Approval of the Detailed rules of production of organic products (raw materials) of vegetable origin" and a number of other by-laws are currently considered as the main legislative acts, which define the principles of state policy in the sphere of production and marketing of organic agricultural products.

Consequently, the legal definition of the main directions of the state policy allows agricultural producers to perceive and understand further "steps" in the development of social relations in the sphere of organic production of agricultural products, to plan production and management processes in business, to take an active part in their formation and legal implementation.

Subjects of organic production

Among the subjects of legal relations on organic production there are individuals and legal entities that have passed the assessment of conformity of production of organic products (raw materials), have received a certificate of conformity and are included in the register of producers of organic products (raw materials). At the same time, the current legislation of Ukraine does not impose any additional requirements on legal entities and individuals who are planning or already engaged in the production of organic products (raw materials). Agricultural enterprises of all types and their associations, as well as economic partnerships, agricultural cooperatives, state-owned enterprises, farms and their associations, private (privately-owned) enterprises, other privately owned enterprises, as well as individuals-entrepreneurs and simply individuals can act as parties of legal relationships regarding organic production. But all of them in their activities should take into account the special requirements that are defined by the Law of Ukraine "On the production and circulation of organic agricultural products and raw materials". Foreigners and stateless persons can also obtain the status of subjects, engaged in organic production.

It can exist in various organizational and legal forms - an agricultural society, cooperative, state and communal agricultural enterprises and other business entities, based, for example, on private property. It should be noted that joint ventures with the attraction of foreign capital play an important role in the development of the domestic

agro-industrial complex. In the conditions of the development of a market economy, these entities may be based on any form of ownership and independently choose the organizational-legal form in accordance with the Commercial Code of Ukraine and the Civil Code of Ukraine, etc.

The concept and status of a joint venture is defined by the Law of Ukraine "On foreign economic activity", which states that joint ventures are enterprises that are based on the joint capital of economic entities of Ukraine and foreign economic entities, joint management and joint distribution of management results and risks (Law of Ukraine, 1991).

At the same time, legislation divides joint ventures depending on the size of the participation of foreign capital in its authorized capital. According to Article 116 of the Commercial Code of Ukraine an enterprise in whose statutory fund at least 10% is a foreign investment is determined as an enterprise with foreign investments. The law defines the branches of management and the territories in which the total amount of participation of the foreign investor is established, as well as the territories in which the activity of enterprises with foreign investments is limited or forbidden, proceeding from the requirements of ensuring national security (Commercial Code, 2001).

Article 3 of the Law of Ukraine "On the regime of foreign investment" states that one of the forms of foreign investment in Ukraine is the partial participation of foreign investors in enterprises that are created jointly with Ukrainian legal entities and individuals or the acquisition of a share of operating enterprises (Law of Ukraine, 1996).

As noted in the literature, one of the most effective ways of attracting domestic and foreign investors is the creation of joint ventures, although they do not have a quantitative advantage (Ficher, 1999). Joint ventures belong to more complex organizational structures of international cooperation, which carry out their production activities through direct investment (Ülbert, 1992).

One of the best examples of joint ventures in the field of organic production is a Ukraine-Swiss company "EthnoProduct". 25 percent of the shares of the company are owned by the Swiss company. Since 2008, EthnoProduct's farm and food operations have been certified organic by Organic Standard - a well reputed Ukrainian organic certification body. All products adhere to organic farming and animal husbandry methods, using only natural ingredients during processing to conserve the natural properties of the final food product. The modern farm complex and the newest high-tech milk processing plant make it possible to achieve high quality and product safety indicators. The main activity of the enterprise is the production of organic certified dairy products, the development of the organic products market in Ukraine.

Thus, enterprises with foreign capital are a progressive form of management, an instrument for the formation of market relations in the Ukrainian economy. They, as a form of international cooperation, have a significant impact on integration processes in the global system of management.

In order to product the organic products (raw materials), individuals and legal entities have the right to carry out certain actions that comprise the content of the certification stages: 1) the confirmation of conformity of production of organic products (passing conformity assessment of organic production, obtaining a certificate of conformity, inclusion in the Register of producers of organic products) and 2) marking.

Certificate of organic land plot - a legal document certifying the legal status of an organic land plot and obliging the owner (user) of the land to grow high-quality organic agricultural products, safe for health and life, environment and other spiritual and material values, their priority implementation in the domestic and international markets. Such certificate is issued to the owner (user) of the land plot, which has undergone the certification procedure in accordance with the procedure established by the Cabinet of Ministers of Ukraine.

In order to ensure the free circulation, import of organic products, the national legal regulation in the field of certification of organic agricultural production must take into account the provisions of the relevant international standards, which can be conditionally divided into:

1. Basic regulatory standards and rules: EU standards: EU Council Regulation 834/2007, EU Commission Regulation 889/2008, EU Commission Regulation 1235/2008; US National Organic Program (NOP); Japanese Agricultural Standards (JAS); Swiss Organic Rules (SOR).

2. International Standards: Basic Standards for Organic Production and Processing of Products (IFOAM IBS) and Codex Alimentarius.

3. Private standards (the most widespread): Naturland, Demeter, ECOLAND (Germany), Bio Suisse (Switzerland), Soil Association (UK), KRAV (Sweden).

In Ukraine, the certification of organic production is carried out according to the following standards: BIOLan - Ukraine (private Ukrainian standards for organic production and labeling of organic products and foodstuffs); European Union standards; Japanese agricultural standards; American agricultural standards; Standards for Bio Suisse.

Among the domestic certification companies are the following: Certification body "Organic Standard", Organic products manufacturers Association "Organic Ukraine", Bio Production Association "BIOLan Ukraine", Federation of organic movement of Ukraine, Association of organic farming and horticulture, Illinetsky Agricultural State College, Organic producers Association "Clean Flora", Information Center "Green Dossier", Retail Academy, etc.

There are 17 international accredited certification bodies in Ukraine (and only one of them is Ukrainian – "Organic Standard"), which are included in the official list of approved certification bodies in the organic sector in accordance with EU Regulation 1235/2008 dated 15.12.2016. An organic producer can apply to any certification body that has international accreditation.

IFOAM (International Federation of Agricultural Movement) is considered as an international organization that develops standards and monitors compliance with accreditation rules by accredited national organizations. Agricultural products cannot be recognized as "organic" unless they are certified by an IFOAM accredited body and cannot be exported abroad.

Manufacturers of organic products (raw materials) must also be entered to the register provided for in Article 1 of the Law of Ukraine "On the production and circulation of organic agricultural products and raw materials". It should also be noted that the capacity (objects) for the production, processing and marketing of food products and their operators are recorded in the register of facilities (objects) (Law of Ukraine, 2013). Additionally, the above-mentioned entities have to be registered in a central executive body that implements the state policy in the sphere of plant quarantine, in those cases, when such entities produce seed and planting material; carry out storage and processing of grain, etc. (Law of Ukraine, 1993).

The procedure for registration of producers of organic products (raw materials) is established by Article 13 of the said Law and by the Resolution of the Cabinet of Ministers of Ukraine dated August 8, 2016, No. 505 "On Approval of the register of producers of organic products (raw materials)". According to the requirements of the legislation, the responsibility for maintaining the Register of producers of organic products (raw materials) is now assigned to the State Service of Ukraine for Food Safety and Consumer Protection (State Committee for Consumer Safety). Appropriate powers are stipulated by the Regulation on the State Service of Ukraine for Food Safety and Consumer Protection (Resolution of the Cabinet of Ministers of Ukraine, 2015).

Labeling provides identification of agricultural products as organic. In Ukraine, as in the EU countries, labeling of organic products (raw materials) is required. At the beginning of 2017, about 200 farms and about 40 companies - food producers took organic certification in Ukraine. The labeling procedure is regulated by Art. 29 of the Law of Ukraine "On the production and circulation of organic agricultural products and raw Materials", as well as by the order of the Ministry of Agrarian Policy and Food of Ukraine "On Approval of the state logo for organic products (raw materials)".

A mandatory condition for the labeling of organic agricultural products (raw materials) with the state logo in Ukraine is receiving by the manufacturer of such products of the certificate of conformity. The certificate is issued if: a) all ingredients of live or unprocessed agricultural products are organic and produced in accordance with established requirements; b) the processed agricultural products were completely made in accordance with the requirements of the Law of Ukraine "On the production and circulation of organic agricultural products and raw materials" and at least 95 percent of its ingredients are organic, which is in compliance with EU legislation (Law of Ukraine, 2013).

Labeling, which is being derived from an assessment of the conformity of production of organic products, acts as a means of bringing the information about organic products

(raw materials) to the attention of consumers by the manufacturer (seller). The current legislation of Ukraine provides for the use of state and non-governmental logos when marking organic products. This indicates the existence of an alternative certification system in Ukraine.

Objects of organic production

An obligatory element of the relations regarding organic production is their object. Objects of legal relations concerning organic production are land plots, land parcels (shares), property, behavior, etc. In the sphere of organic farming among the objects dominant role belongs to land plots.

Today in Ukraine there are about 500 thousand hectares of land where production of agricultural organic products is carried out (Chychkalo-Kondratska, Novytska, 2018). The status of land that is used for this purpose is determined by Article 22 of the Land Code of Ukraine. Thus, according to the aforementioned norm, agricultural lands are recognized as land provided for agricultural production, agricultural research and educational activities, the placement of appropriate production infrastructure, including the infrastructure of wholesale markets for agricultural products, or intended for these purposes (Land Code of Ukraine, 2001). Consequently, the production of agricultural crop products, including organic, can be carried out exclusively on agricultural lands.

The choice of land is an important stage in the process of production of organic products, since the quality of the cultivated product depends on it. The assessment of the suitability of the land (soils) for the production of organic products and raw materials, as well as the establishment of zones for the production of organic products and raw materials are carried out by the State Inspection of Agriculture of Ukraine on the conclusion of the relevant scientific institutions, research institutes, laboratories of quality and safety of products in accordance with the legislation. Such an assessment is made taking into account the ecological and toxicological indices of the agrochemical passport of the land plot and the results of the chemical analysis of test plants that are grown on these soils at the time of the survey. Today, the availability of land agrochemical passport is required. Agrochemical land certification data are used in the process of regulating land relations in: transfer of ownership or provision for use, including lease, of a land plot; change of owner of a land plot or land user; conducting monetary valuation of land; determining the size of the payment for land; carrying out control over the soil fertility condition.

The assessment of the suitability of the lands (soils) is carried out with the aim of obtaining objective information from the interested parties (economic entities producing, transporting, storing and selling organic products, raw materials), establishing their suitability for production organic produce and raw materials, suitable for the production of relevant crops (Fedchyshyn, 2017).

Domestic scientists pay attention to the fact that the land that will be assessed as suitable for organic farming should be recognized as the object of special legal protection in order to ensure the maintenance of the suitability of land plots for future use for the

cultivation of plant organic products (Kulynych, 2009). Establishing the legal regime for their special protection will serve as a guarantee of the growth of the competitiveness of agricultural products on the world market and is a prerequisite for the prosperity of agriculture in Ukraine.

According to the contents of the Land Code of Ukraine, land plots for the production of organic agricultural products and raw materials can be used on various legal titles: the right of ownership (private, state and communal), the right to permanent use, the right to lease, etc. (Land Code of Ukraine, 2001).

The Constitution of Ukraine declares that the right to ownership of land is guaranteed. Such right is acquired and exercised by citizens, legal entities and the state only in accordance with the law (Part 2 of Article 14 of the Constitution of Ukraine). The Constitution also states that everyone have the right to own, use, or dispose of his property and the results of his intellectual or creative activities; the right for private property should be acquired in compliance with the procedure established by law; no one can be unlawfully deprived of the right for property; the right for private property is inviolable (Constitution of Ukraine, 1996).

Also in accordance with Part 2 of Article 14 of the Constitution of Ukraine the choice of the legal title for the use of agricultural land should be made on the basis of the will of the people, who create farms or other organizational and legal forms of commercial agricultural production (Constitution of Ukraine, 1996).

Today, the bulk of agricultural land in Ukraine is being processed not by the owners of land, but by users of land plots (tenants). The use of the most part of agricultural land by tenants is the main reason for the relatively low level of organic farming development in Ukraine. In its turn, the main reason for the separation of the agricultural producer from the ownership land - is the existence of a moratorium on the alienation of agricultural land (paragraphs 14, 15 of Section X Transitional Provisions of the Land Code of Ukraine). The moratorium is a delay (before January 1, 2019 and adoption of the law on the circulation of agricultural land) in the realization of the right to purchase and sale or other ways of alienation of agricultural land plots and changes in their intended purpose, as well as their inclusion in the authorized capital of enterprises.

In Ukraine, the range of subjects of the right of private property on agricultural land, including those used for organic farming, is legislatively limited. Only citizens of Ukraine and legal entities of Ukraine can act in this role. In accordance with the Article 22 of the Land Code of Ukraine agricultural land cannot be transferred to the ownership of foreigners, stateless persons, foreign legal entities and foreign states. At the same time, according to the Article 81 of the Land Code of Ukraine agricultural land, inherited by foreigners, as well as stateless persons, have to be alienated during the year (Land Code of Ukraine, 2001). The issue of agricultural land received by inheritance by foreign legal entities is solved in a similar way. In turn, for the aforementioned subjects there are no restrictions on the transfer of land plots to the lease.

It should also be noted that in some foreign countries, temporary restrictions on ownership of agricultural land have also been introduced for foreign citizens and legal entities. Restrictions for foreigners are also used in different volumes: for example, in Brazil there can be no more than 25% of the agricultural land of the administrative-territorial unit in the ownership of foreigners; foreigners in the Czech Republic can buy land, if they are citizens of EU member states, and also have more than 3 years of permanent residence in the Czech Republic and registered as farmers. Other countries, such as Estonia, Lithuania, Latvia, Slovakia, Hungary, as well as Bulgaria and Romania, have established a transitional phase (which lasted up to 7 years from accession to the EU). During this period, foreign citizens were not able to buy agricultural land.

In countries which have recently joined the European Union, the application of the aforementioned restrictions on agricultural land to foreigners was due to the fact that in these countries the land market has not completed the system of registration of rights to real estate. The land market was also in the stage of formation and the creation of a land cadastre. In addition, citizens of the abovementioned countries had significantly lower incomes than citizens of other EU countries, the price of land plots was several times smaller than in other EU countries, and therefore they were not competitive in the land market.

The use of lease of agricultural land in the countries of Western Europe has been considerably widespread. In Belgium, for example, about 70% of the available land is leased, and in France and Germany this figure is 60%. On average, in the EU countries, leased land accounts for 40% of all agricultural land. In other countries, the figure is significantly lower, for example, 30% in Canada, 20% in Japan, 14% in New Zealand, 12% in the United States, 5% in Australia and Argentina.

In a number of countries, there are transparent rules for the use of land with efficiently functioning land markets, in particular, its lease. In this case, the conditions of lease of agricultural land are quite different. Leasing of land is carried out on a contractual basis. There are several main types of such agreements. Agreements of the first type include the state's provisions on the maximum size of the rent and the terms of the contract. Such agreements are usually long-termed and more profitable for lessee, since they support the reduction of the elasticity of the land lease market.

In France, lease agreements mainly belong to the first type of lease of agricultural land and mainly protect interests of tenants: the terms of the lease are long-termed and legally regulated, the terms of the contracts contain provisions that, even after the end of the contract, must ensure the interests of the tenant, the state establishes the upper and lower ranges of rent.

The next type of lease agreement is characterized by the fact that the lease term and price are determined exclusively by market conditions. Lease agreements of the second type are the most widespread in Germany, Sweden, the Czech Republic, Slovakia and Lithuania. Conditions of lease of agricultural land in the specified European countries are determined mainly on the basis of the situation on the land market.

Both types of lease agreements coexist in Italy and the UK. However, with respect to the part of agreements of the second type, there is a tendency to increase (on the basis of mutual agreement).

Some experts generally believe that land lease agreements are more suitable for the functioning and organization of agricultural land market (Antipova, 2007). As an example, there are two successful countries, namely Israel and the Netherlands, who formed their land relations on the principle of land lease, where the vast majority of agricultural land is state-owned. The main advantages of such an approach are: 1) the excessive concentration of land in the hands of the sole owner and the avoidance of the creation of land latifundia; 2) preventing the grinding of land; 3) the possibility of reserving land for social needs.

The lease is also provided by the legislation of Ukraine. In today's conditions of development of land relations, it plays an important role as one of the dominant forms of realization of property rights and the effective use of land. At present, agricultural enterprises are conducting business activities mainly on leased land, which accounts for about 92% of their total land use. The basis for the emergence of lease relations is the land lease agreement - the main document defining the relationship between the lessor and the lessee. Ukrainian civil law provides general requirements for the conclusion of lease agreements, and the land legislation reflects the features of this agreement regarding the lease of land plots.

According to Article 93 of the Land Code of Ukraine land plots may be leased to citizens and legal entities of Ukraine, foreigners and stateless persons, foreign legal entities, international associations and organizations, as well as foreign states (Land Code of Ukraine, 2001). The Law of Ukraine "On the lease of land" establishes a list of essential provisions of the land lease agreement, the observance of which is mandatory at the conclusion of the agreement. These include: the object of lease (cadastral number, location and size of land plot); term of the lease agreement; a rent with an indication of its size, indexation, method and terms of calculations, terms, the order of its introduction and review, and responsibility for its non-payment. By the agreement of the parties in the agreement there may be specified other provisions, in particular, the qualitative condition of land, the procedure for fulfilling the obligations of the parties, the procedure for insurance of the object of lease, the procedure for reimbursing the costs for the implementation of measures for the protection and improvement of the object of lease, as well as the circumstances, which may affect the change or termination of the lease agreement, and others (Law of Ukraine, 1998). The Resolution of the Cabinet of Ministers of Ukraine "On approval of the Model land lease agreement" has approved the Model land lease agreement.

The Land Code of Ukraine provides the possibility of concluding land lease agreements for a term of 1 to 50 years (Land Code of Ukraine, 2001). This ensures competition in the market of agricultural land lease, which results in an increase in the size of the rent, the improvement of the forms and conditions of its payment. The terms of agreements

are different - in the vast majority of them they are concluded for 6-10 years, that is, the prevailing medium-term lease (more than 43.7%). It seems more expedient to establish a long-term lease of agricultural land and to determine the conditions for early termination of such contracts.

In the legal literature there are discussions on this subject. So, according to M.Shchetina, long-term lease allows the tenant to be guided by the interests of the owner with the corresponding consequences for land use (Shchetina, 2012). On the other hand, by reason of P. Kulynych, the transfer of agricultural land for a long time is unfavorable for peasants, because it is difficult for them to predict the development of land yield due to changes in economic conditions on it and to determine the appropriate amount of rent for their land (Kulynych, 2009).

It is beneficial for any society to use all the resources used to produce goods rationally, that is, in terms of per unit of consumed resources produced the maximum amount of products. Therefore, the state should actively support the tenant in order to reduce the negative process of degradation of agricultural land, reduce the imbalance between the land area and other factors of production. That is why it is expedient to apply longer lease terms allow lessees to invest in long-term improvement of land, the organization of stable production, and to take measures to preserve and protect the soils, which are also used for organic farming.

The economic activity of modern agricultural enterprises based on the lease helps to increase the efficiency of agricultural production. Due to the functioning of the land lease mechanism, active development of entrepreneurial activity in the agrarian sector is taking place. Formed enterprises of the market type, the processes of vertical integration became more active, which in aggregate contributes to the provision of food security of the state and to the growth of the export potential of organic products.

The emphyteusis, which is a right to use another's land for agricultural needs, became widespread recently. This right is long-term, alienable and inherited. It was introduced into the land legislation of Ukraine in 2007 and since then became a tangible competitor to the lease law institute. It is very relevant and has differences from the lease.

In accordance with Article 102-1 of the Land Code of Ukraine, the right to use another`s land plot for agricultural needs (emphyteusis) arises on the basis of an agreement between the land plot owner and a person who has expressed a will to use this land for such needs, in accordance with the Civil Code of Ukraine (Land Code of Ukraine, 2001).

The significance of emphyteusis is also aggravated by the fact that, with almost complete blockage of the secondary market of agricultural land, it is advisable to appeal to an alternative institute that can ensure the interests of the user to obtain more reliable and stable rights than with the conclusion of the lease.

Unlike the land lease agreement, the essential provisions of the agreement on the emphyteusis are not defined by law. In accordance with Part 1 of Article 638 of the Civil Code of Ukraine an agreement can be concluded, if the parties have duly reached a consensus on all its

essential provisions. Essential provisions of the agreement are the subject of the agreement, provisions that are established essential by the law or necessary for the agreements of a specific type as well as all those provisions, in respect thereof a consensus is to be reached upon application of at least one of the parties (Civil Code of Ukraine, 2003).

According to Article 632 of the Civil Code of Ukraine the price in the agreement should be determined upon the agreement between the parties. In cases established by the law the prices (tariffs, rates etc) established or regulated by the authorized governmental bodies or local self-governments should be applied. The rent for land plots of state and communal property is a regulated price, and therefore the legislative change of the maximum amount of this fee is the basis for revision of the rent amount established by the provisions of the contract (Civil Code of Ukraine, 2003). That is why the private-law nature of the regulation of emphyteusis is advantageously different from the overly regulated obligations of lease of land.

Part 2 of Article 21 of the Law of Ukraine "On the lease of land" makes special demands regarding the terms of rent payment for land plots of state and communal property. In contrast, the agreement on the emphyteusis provides full freedom in determining the size, form and timing of payment for this agreement (Law of Ukraine, 1998). Consequently, the payment for such use of land is paid to the owner of the land in the size, form, in order and in the terms specified in the agreement on the right to use another`s land for agricultural needs.

The advantage of emphyteusis over the lease agreement is the unlimited duration of its validity, as well as the one-time receipt of the entire amount of money by the owner of the land, while under the lease agreement the owner will receive funds in installments. The advantage of emphyteusis is also that such a right, unlike the lease, may be indefinite, whereas the latter is limited to 50 years. But it should also be borne in mind that an indefinite agreement of emphyteusis can only be if the land is privately owned. The term of use of the land plot of state or communal property for agricultural needs also cannot exceed 50 years (Article 4, Article 102-1 of the Land Code of Ukraine and paragraph 1 of Article 408 of the Civil Code of Ukraine).

Taking into account the benefits of emphyteusis on its indefinite duration, those who want to purchase agricultural land are often offered to conclude an agreement of emphyteusis. After the conclusion of the agreement, the citizen will be "almost the owner" of the land, since he receives the latter not only for the indefinite possession and use, but can still dispose of the acquired right. In particular, according to the Article 102-1 of the Land Code of Ukraine and Article 407 of the Civil Code of Ukraine the right to use another`s land for agricultural needs (emphyteusis) may be alienated and transferred in order of inheritance, except for the right to use the land plot of state or communal property which cannot be alienated to other persons (except for cases of transfer of ownership to buildings and structures), deposited in the authorized capital, transferred to a pledge. In addition, emphyteusis can be a convenient means to ignore the prohibition of the acquisition of agricultural land by foreigners and stateless persons.

Legislative consolidation of legal mechanisms for the further development of relations of agricultural land use laid the foundations for sustainable development of relations in the sphere of organic production in Ukraine.

Discussions

One of the most rational and ecological methods of agricultural production is the organic farming, which ensures proper protection of the environment, rational use of land and other natural resources, ensuring the production of quality and nutritious food. Organic production plays a double social role, when, on the one hand, it involves the functioning of a special market that meets the needs of consumers in organic products, and, on the other hand, provides the public with products that promote the protection of the environment and the welfare of animals, as well as the development of the countryside.

The total area of certified organic agricultural land is growing rapidly, which today accounts for 1% of Ukraine's total agricultural land. According to the territories, which are occupied by organic production, Ukraine ranks 22nd in the world (Trofimtseva, 2017). At the same time, according to the FAO (Food and Agriculture Organization), the agroecological potential of yield in Ukraine is 6.2 tons per hectare and is the highest in the world, but in fact its only 2.5 tons per hectare (Nahorna, 2011). Consequently, Ukraine has significant potential and prospects for forming the agro-ecological image of the country of organic farming.

Creation of joint ventures in the sphere of organic production is now extremely relevant and positive. Joint ventures invest heavily in new technologies for product quality management, stimulate the process of production of competitive products, facilitating its access to international markets.

Modern activation of the development of domestic organic production is the result of the fact that Ukraine has favorable conditions for organic agriculture due to the large area of agricultural land, among which a significant share belongs to fertile black soil, convenient geographical location, proximity to potential international buyers and ever-increasing demand for organic products on the domestic and foreign markets.

Conclusions

The need for solving environmental problems and the issue of providing people with good-quality food products is closely linked to the need for a transition from traditional to organic farming. At the same time, it is important for the agricultural producers of Ukraine to develop ecological production in order to increase competitiveness in the markets of Ukraine and the world. Organic farming in Ukraine as a large agricultural country has a unique potential, which involves the development of agriculture and attracting investment. World agricultural development confirms that biotechnology will become more and more important in the future.

Taking into account the joint desire of state authorities, businesses to bring Ukraine to the world's leading positions in producers of organic products, the ever-increasing demand for organic products in the domestic and world markets, there is every reason to hope that Ukraine will remain a source of high-quality organic products and a reliable partner in the organic business for the international market, on the gradual rebirth of soil fertility and the improvement of the environment. For this purpose, the implementation of the legislative framework of Ukraine to the EU legislation is carried out. Today the legislation provides opportunities for foreign capital for organic production in Ukraine through the creation of joint ventures. In addition, Ukraine has a system of certification of producers and products of organic origin that meets all European standards. At the same time, the law provides for certain restrictions for foreigners, which are aimed at ensuring the national interests of the state. This is, first of all, a moratorium on the purchase of agricultural land by foreigners. However, the availability of such types of land use as lease and emphyteusis, enables foreign citizens and companies to successfully engage in organic production on the territory of Ukraine.

Conflict of interests

The authors declare no conflict of interest.

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THE EFFICIENCY ANALYSIS IN SMALL WINERIES IN THE REPUBLIC OF SERBIA

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ABSTRACT

This paper contains the attempt to evaluate the activity development efficiency of small wineries in the Republic of Serbia as insufficiently used development potential of one industry branch. Small wineries represent an activity which is currently being developed and it is expected that it will, as it is the case in developed countries, contribute to the total economic development and employment, development of brand as recognizable brand of wine from this region and start further recognizable development of this branch as family business in the country and abroad. The analysis was performed using the non-parametric linear programming model DEA (Data Envelopment Analysis). The aim of this paper is that, using the analysis of financial statements and the effectiveness of representative wineries belonging to the category of small enterprises, a rational strategic decision-making is provided.

Introduction

Wine growing in the Republic of Serbia is an important agricultural branch. On the one hand, it contributes to the economic progress of the entire country and on the other to the affirmation of rural areas and promotion of the areas where wine is produced. On the entire territory of the Republic of Serbia about 25,000 hectares are planted with the vines. The natural resources, climate, tradition and other allow its gradual revival and

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rehabilitation in the coming years with at least 50 thousand hectares (Ivanišević, Jakšić & Korać, 2015) (see also Lukić, Lalić, Sućeska, Hanić & Bugarčić, 2018).

The subject of research are small wineries operating in the Republic of Serbia and their efficiency. The paper is based on a systematic and comparative analysis of the available scientific literature, as well as on the author's research results and experience in creating and implementing successful development strategy of small wineries based on the analysis of financial statements using the internal method of research. The research procedure was carried out on the basis of analysis of the contents of the primary and secondary sources, on the sample of 12 small wineries in Serbia, using financial statements according to official data from ABR (Agency for business registers). The evaluation of efficiency (super-efficiency) of the wineries was performed by applying the DEA model based on composite indicators. This paper will examine the influence of six indicators on the efficiency of the wineries, as follows: net working capital, retained earnings, EBIT (earnings before interest and taxes), the book value of capital, total assets and total debt. These analyzes will be carried out on concrete examples of small wineries as the representatives of small businesses whose development makes a strong link in the development of the manufacturing and processing industry of the Republic of Serbia.

The aim of the research is to obtain a clearer picture of the level of efficiency of local wineries using the analysis of efficiency among the representative wineries in Serbia, belonging to the category of small enterprises, that can enable a more rational strategic decision-making.

Literature review

A customary way of measuring the performance of financial systems is the use of indicators which are used for defining profitability, ratio of assets and liabilities, portfolio quality or efficiency. The efficiency consists of achieving as great as possible economic effects (output) with the smallest possible economic sacrifice (inputs) and is one of the most important principles of every business (Martić, 1999). Efficiency can be defined as the ability to achieve the desired goals with minimal use of available resources.

Starting from the inadequacy of the partial indicators such as labor productivity and capital productivity, Farrell (1957) proposed analytical procedure for measuring the effectiveness and evaluating the efficiency limits of production. Farrell considered a case when an organization uses multiple inputs and produces one output and assumed the constant return to scale. Some organization operates with constant returns to scale if an increase in its inputs results in a proportional increase in its outputs. Farrell introduced and defined the following three measures of efficiency: technical, allocative and overall efficiency.

According Koopmans' definition of technical efficiency (Koopmans, 1951) a manufacturer is technically efficient if and only if it is not able to increase production of some of the outputs without reducing the production of another output or usage of larger amounts of

one of the inputs. Efficiency of the allocation of resources is expressed as a percentage, where 100% indicates that the organization appropriately uses the inputs so as to minimize the cost of manufacture. An organization that is efficient in the engineering (technical) terms may be allocatively inefficient, since it does not use the inputs in the appropriate proportion with respect to the given prices (Savić, 2012). The overall efficiency combines technical and allocative efficiency. An organization can be cost-efficient only if it is the technically and allocatively efficient. Overall efficiency is calculated as the product of technical and allocative efficiency (expressed in percentages). It means that the organization can achieve cost-efficiency of 100% only if the technical efficiency is equal to 100% and the efficiency of resource allocation equal to 100%.

To achieve more efficient management of payables wineries should consider the need to conduct a range of activities, such as (Knežević & Fabris, 2010): improvement of information systems that will improve the quality of information used in the analysis of working capital; defining and monitoring of key performance indicators (level of obligations with respect to the operational costs, the average period of collection, age-structure of the obligations and the like); defining adequate policy, procedures and control mechanisms for payables management; considering the possibilities of reducing the number of suppliers of the same product group in order to ensure more favorable conditions for procurement (lower prices and longer credit period), as well as the implementation of adequate policy related to the selection of suppliers which aims at selecting and doing business with companies that are reliable and have a good reputation (see also Mitrović, Knežević & Veličković, 2015).

Data envelopment analysis (DEA) is the approach of non-parametric linear programming, which allows processing of multiple inputs and multiple outputs (Paradi, Asmild, Aggarwall & Schaffnit, 2004) or the simultaneous analysis of different types of inputs and outputs. DEA model can be constructed either to minimize the inputs or to maximize the outputs. In the input-oriented model efficacy is enhanced through a proportional reduction in the input and output orientation requires proportionate increase of the output (Cooper, Seiford & Tone, 2000). DEA is a tool for measuring and monitoring the effectiveness of organizational performance. Organizational units of DMU (Eng. Decision Making Unit) are defined as the units to be decided on (Savić, 2012). This name was introduced to show that the DEA can be used to measure the effectiveness of different types of entities, which operate in a similar manner. In addition, it can be concluded how much it is necessary to reduce the specific input and/or increase the specific output to make these units become efficient.

In the literature relatively low attention has been paid on how these inputs and outputs should be selected. Some authors treat the input and output variables in their studies as “the given” and then they move on to the methodology itself. Others use statistical methods (e.g., regression and correlation analysis) as assistance in the reduction of the number of criteria. The selection of DEA model and choice of input and output variables depends on the aim and purpose, but also on each individual case.

From the methodological point of view (Sellers-Rubio, Alampi-Sottini & Menghini, 2016) defining the inputs and outputs is one of the main problems that arise in the assessment of efficiency in the wine industry. In this respect, when comparing relative performance of wine producers, it is possible to take into account the technical perspective, which analyzes the ability of a winery to transform certain volumes of the inputs to as great as possible outputs (e.g., liters of wine) or to analyze the ability to transform some inputs to the output values (e.g., sale). The first approach is called the concept of technical efficiency, while the second approach is considered as the economic concept of efficiency. In accordance with the principles of DEA for measuring the efficacy of wineries often selected are the input and output parameters (variables) on the basis of previous studies of the authors and the recommendations from the scientific literature (Sellers & Alampi-Sottini, 2016). These authors conducted a study on the analysis of the size of the wineries on their economic performance on the territory of Italy. The results showed a positive and statistically significant correlation relationship between size and profitability of the wineries. Larger wineries have greater negotiating power with its stakeholders, as well as easier access to international markets. Likewise, smaller wineries have great technical and commercial opportunities.

A composite indicator is an aggregate index, containing individual parameters and their corresponding weight coefficients. It was created by UNDP (2000), as a sum indicator of human development index (HDI). The HDI index is an average measure of basic achievements in terms of human development in a country: age, knowledge and standard of living. It measures the multidimensional concepts that cannot be captured by one indicator. The system of forming weight coefficients may be based on DEA method.

Therefore, the DEA models need to be modified by introducing Dummy variables equal to 1 and several outputs with normalized or raw data, in order to cover the composite indicators. Each sub-component within the DEA analysis is seen as the input, since an increase in its value favors the observed financial book values. That is why Melyn & Moesen (1991) and Cherchye et al. (2007) created a special class of models called "benefit of the doubt". This model can mathematically be expressed as follows (Shen, Ruan, Hermans, Brijs, Wets & Vanhoof, 2011):

$$(\max) h_k = \sum_{r=1}^{s} u_r y_k \qquad (1)$$

a.c.

$$\sum_{r=1}^{s} u_r y_k \leq 1, \quad j = 1,...,n \qquad (2)$$

$$u_1,...u_s \geq 0 \qquad (3)$$

where: h_k- relative efficiency of the k-th DMU; n – the number of DMU to be compared; m – number of inputs; s – number of outputs; u_r- weight coefficient for the output r; v_i – weight coefficient for the input i.

Data on wine production in Serbia and methodology used in research

Data on wine production in Serbia

The starting point of research consists of statistical data on the production of wine. In *Table 1*, ranking of wine producers is performed. The largest wine producer in the world in 2015 was Italy with 48,9 million hl produced. It is followed by France with 47,4 mhl. Serbia is on the 19th place with 2,3 million hectoliters of wine produced. If we look at Europe, first four places occupy Italy (48,9 mhl), followed by France (47,4 mhl), Spain (36.6 mhl) and Germany (8,8 mhl) (OIV, 2015).

Table 1. Production of wine (excluding juice and musts) (1)

Unit: 1000 hl	2010	2011	2012	2013	2014 Provi-sional	2015 Forecast	2015/2014 Variation in volume	2015/2014 Variation in %	Ranking
Italy	48,525	42,772	45,616	54,029	44,229	48,869	4,640	10	1
France	44,381	50,757	41,548	42,134	46,804	47,373	569	1	2
Spain	35,353	33,397	31,123	45,308	38,211	36,600	-1,611	-4	3
United States (2)	20,887	19,140	21,650	23,590	22,020	22,140	120	1	4
Argentina	16,250	15,473	11,778	14,984	15,197	13,358	-1,839	-12	5
Chile	8,844	10,464	12,554	12,820	10,500	12,870	2,370	23	6
Australia	11,420	11,180	12,259	12,310	12,020	12,000	-20	0	7
South Africa	9,327	9,725	10,569	10,982	11,316	11,310	-6	0	8
China*	13,000	13,200	13,511	11,780	11,178	*11,178*	0	0	9
Germany	6,906	9,132	9,012	8,409	9,202	8,788	-414	-4	10
Portugal	7,148	5,622	6,327	6,231	6,195	6,703	508	8	11
Russia*	7,640	6,980	6,220	5,290	4,880	*4,880*	0	0	12
Romania	3,287	4,058	3,311	5,113	3,750	4,069	319	9	13
Hungary	1,762	2,750	1,818	2,618	2,555	2,873	318	12	14
Brazil*	2,459	3,460	2,967	2,710	2,732	*2,732*	0	0	15
Greece	2,950	2,750	3,115	3,343	2,900	2,650	-250	-9	16
Austria	1,737	2,814	2,125	2,392	1,999	2,350	351	18	17
New Zealand	1,900	2,350	1,940	2,484	3,204	2,350	-854	-27	18
Serbia*	2,382	2,244	2,175	2,306	2,332	*2,332*	0	0	19
Bulgaria	1,224	1,237	1,442	1,755	747	1,538	791	106	20
Moldavia*	840	1,520	1,470	2,570	1,630	*1,630*	0	0	21
Georgia*	1,034	1,108	830	997	1,134	*1,134*	0	0	22
OIV World Total (3)	**264,188**	**267,803**	**258,211**	**292 218**	**270,234**	**275,665**	**5,431**	**2**	

(1): Countries for which information has been provided with a wine production of more than 1 mhl
(2): OIV estimate based on UDSA info
(3): OIV estimate: mid-range estimate. Range for evaluation of 2015 world production: from 270,75 mhl to 280,7 mhl
* 2015: 2014 Data used as provisional figures

Source: The International Organization of Vine and Wine (OIV)

According to currently available data, in 2014 Serbia produced 198,183,000 liters of wine. This is by 71,783,000 liters more than in 2012 and by 39,863,000 liters less than in 2009 when it produced the most wine in the reporting period from 2009 to 2014, as shown in *Table 2*.

Table 2. Total wine production in Serbia from 2009 to 2014

Year	Wine production in [l]
2009	238,046,000
2010	148,753,700
2011	158,084,500
2012	126,400,000
2013	145,283,700
2014	198,183,000

Source: Wine Atlas, 2015

According to data from the Wine registry from 01.01.2014, the number of large wineries in Serbia with more than 250 employees is small, only two wineries. Belonging to medium-sized wineries having from 50 to 249 employees is only one winery; although, by the quantity of produced wines, it occupies a large share of total production. There are 23 small wineries, with the number of employees from 10 to 49. Micro wineries, with less than 10 employees make up the largest group of wine producers in Serbia and there are 191 (Jakšić, Ivanišević, Đokić & Brbaklić-Tepavac, 2015).

The largest Serbian wineries distribute their wine in Serbia and in some countries in the region through an independent distribution network, consisting of offices in major cities in Serbia (Belgrade, Novi Sad, Niš, Kragujevac, etc.), HoReCa, managers for capillary sales, etc. Distribution of wine to the end consumers usually takes place directly through the wholesale and retail trade of consumer goods chains, distributors, wine shops and catering facilities (restaurants, cafes, hotels, motels, rural tourism facilities, etc.) (Jakšić, Ivanišević, Đokić & Brbaklić-Tepavac, 2015). The smallest part of wine is distributed directly to end consumers in the wineries themselves, when consumers, as tourists, visit the wineries (the wine routes, catering, etc.). In order to include the traditional family wineries in Serbia in tourism development, they should be enriched by catering facilities. This is primarily related to the organization of the hall for wine tasting as part of a family farm or winery (Jovanović, Muhi & Anđelković, 2015). In this way, owners of wineries would enable potential tourists the tour of the winery and wine tasting.

Table 3. Exports of wines of Serbia by markets [l]

Year	CEFTA	EU	Other markets	Total
2009	**6,971,831**	**642,099**	**2,772,752**	**10,386,682**
2010	**5,906,366**	**1,320,195**	**3,534,877**	**10,761,438**
2011	**5,516,662**	**5,667,380**	**4,130,700**	**15,314,742**
2012	**4,742,479**	**14,118,384**	**3,930,188**	**22,791,051**
2013	**4,357,743**	**2,048,209**	**5,071,769**	**11,477,712**
2014	**5,136,719**	**559,909**	**6,244,893**	**11,941,522**

Source: Wine Atlas, 2015

As regards exports of wine in 2014 Serbia recorded the exports amounting to 11,941,522 liters of wine which is 10,849,529 less than in 2012 when it recorded the highest exports observed since 2009, but more by 1,554,840 than in 2009 when it exported 10,386,682 liters of wine (Table 3).

Methodology used in the research

Due to the fact that in the conditions of intensive development and increasing competition it is often necessary to make mutual comparison of efficient organizations, several approaches are developed for the full ranking of all units. One method of ranking based on DEA efficiency evaluation is a model for the evaluation of super-efficiency that assumes DEA modification of the model so that index greater than 1 can be assigned to efficient units and thus enable the discrimination between them. Andersen and Petersen (1993) proposed a modified DEA model which enables ranking efficient units, i.e. super-efficiency score. Analogously to the proposed model modification of the models (1) - (3) can be made so as to provide a ranking on the basis of the composite indicator (Savić & Martić, 2016):

$$(\max) h_k = \sum_{r=1}^{s} u_r y_k \tag{4}$$

a.c.

$$\sum_{r=1}^{s} u_r y_j \leq 0, \quad j = 1,...,n,\ j \neq k \tag{5}$$

$$u_1,...u_s \geq 0,\ v_1,...v_m \geq 0 \tag{6}$$

The presented modified model allows ranking of the efficiency units similarly as the inefficient units based on the index greater than or equal 1.

Using the data envelopment analysis the efficiency of 12 wineries (DMU) will be performed, which according to the number of employees belong to the category of small enterprises for 2014 and 2015. The production process of the wineries is perceived as a black box in which it is taken that we have a single input with an efficiency of 1, and the output efficiency is viewed through six indicators (Table 4): net working capital, retained earnings, EBIT (earnings before interest and taxes), the book value of capital, total assets and total debt:

$$(\max) h_k = \sum_{r=1}^{6} u_r y_k \tag{7}$$

a.c.

$$\sum_{r=1}^{6} u_r y_{rj} \leq 0, \quad j = 1,...,12,\ j \neq k \tag{8}$$

$$u_1,...u_6 \geq 0,\ v_1,...v_m = 1 \tag{9}$$

Table 4. Model of super efficiency with six outputs

Outputs		Description
1	Net working capital	Five positions from the balance sheet: (Capital + Long term reservations and liabilities – reported but unpaid capital - Loss above equity) - Non-current assets
2	Retained earnings	Three positions from the balance sheet: Retained earnings - Loss - Loss in excess of capital
3	EBIT	Two positions from the income statement: Operating profit - Operating loss
4	Bookkeeping value of capital	Five positions from the balance sheet: Capital - loss in excess of capital – reported but unpaid capital - Deferred tax assets + Deferred tax liabilities
5	Total assets	Two positions from the balance sheet: Operating assets- Reported but unpaid capital
6	Total debt	Two positions from the balance sheet: Long term reservations and obligations

Source: The authors' calculations

As indicators in this analysis, we have taken the ones from Financial reports for the years 2014 - 2015, more precisely:

1) Net working capital as a measure of the company's ability to finance average stocks and new investments. Net working fund is the difference of the greater value of long term funding sources (capital, long-term loans…) in relation to the values of long-term property that is used in performance of the activity (real estate, plants and equipment…). The available amount of net working capital must be minimum equal to the average stocks. The lack of funds of the Net working capital points out that there is a problem in maintaining the current liquidity in business, while the excess of Net working fund above average stocks can be invested in new investments (own participation).

2) Retained earnings is a part of the capital in cumulated non-distributed gain and it represents a measure of proceeds to the invested property and/or capital in performance of activity.

3) EBIT is the gain of the current period enlarged by the income tax and interest costs. In developed countries, this indicator is often used as a measure of success in current business through which we measure the ability of the company to pay debts back. In developing countries, this indicator should be corrected by the amount of financing costs having in mind that, as a rule, they are rather high, and thus regardless of recording them as the expense in the profit and loss statement, they should not be qualified as a part of operating cash flow.

4) Bookkeeping value of capital is the value of the Share capital (equity) and the other capital. It represents a guarantee to the creditors and the measure of company's ability for self-financing.

5) Total assets consists of main and working funds for performing the manufacturing and selling of wine.

6) Total liabilities (debt) are the obligations from commercial or finance transactions.

Indicators that were previously listed and explained are included in the model in order to determine the correlation of the proceeds (Retained earnings) from the property and/or capital, earnings before interests and taxes (EBIT) in relation to the obligations taken and Net working capital as a constant and indicator of mutual relations of indicators in the model having in mind that Net working capital represents an available amount of working capital (source of working funds).

Results and discussion

It is common that in financial analyses operating parameters of companies in the last three years are compared. Since this paper analyzes the economic activity of small wineries whose development is especially present in the last two years, with the specific companies the last two years will be analyzed for the parameters of analysis to be consistent. Still dominating are the companies of entrepreneurs because, on the one hand in accordance with the regulations of the Republic of Serbia organizing entrepreneurial activities is easier, and on the other hand, according to the tax regulations, this kind of organization of performing economic activity is more stimulating (e.g. the possibility of lump-sum taxation, lower tax rates, etc.). General data of the wineries that are subject of the analysis are shown in Table 5.

Table 5. General information on companies analyzed

Or. no	Name of winery	Y. of estab	Wine-growing region	Wine growing district	Aver. no of employ.	Vineyard area [ha]	Annual wine production[l]	No. reg. labels
1.	PIK Oplenac LLC Topola	1956*	Šumadija	Oplenac	16	47,00	700,000	11
2.	"PODRUM RADOVANOVIĆ" LLC Krnjevo	1996	Šumadija	Krnjevac	11	25,00	280,000	14
3.	PTK "KLJUČ" SC Kladovo (trade name "Vinarija Duša")	2007	Negotinska Krajina	Ključko	31	40,07	30,000	2
4.	"STATUS" LLC Svrljig	1997	Niš	Svrljig	36	15,36	1,000,000	12
5.	Radiša Mladenović entrepreneur "MATALJ" Negotin	2008	Negotinska Krajina	Negotin	43	17,00	55,000	11
6.	"TOPLIČKI VINOGRADI" LLC Gojinovac	2008	Toplica	Prokuplje	12	35,00	93,000	9
7.	"VINARIJA ALEKSANDROVIĆ" LLC Vinča	2004	Šumadija	Oplenac	19	69,26	300,000	19
8.	"VINARIJA ALEKSIĆ" LLC Vranje	2006	Vranje	Vrtogoško	12	2,50***	150,000	10
9.	Bogunović LLC Beograd (Zemun)	2010	VIVR**	-	28	2,20	60,000	6

Or. no	Name of winery	Y. of estab	Wine-growing region	Wine growing district	Aver. no of employ.	Vineyard area [ha]	Annual wine production[l]	No. reg. labels
10.	LLC "VINARIJA KOVAČEVIĆ" Irig	2003	Srem	Fruška gora	23	84,00	1,000,000	13
11.	"VINARIJA ZVONKO BOGDAN" LLC Subotica	1989	Subotica	Palić	18	50,00	133,000	11
12.	"VINEX GROZD" LLC Belušić	2008	Three Moravas	Levač	37	35,00	-	12

* Performed privatization, renovated winery opened in 2015
** Winery outside vineyard regions; location of the vineyard: South Banat region, Vršac vineyards
*** in cooperation

Source: Adapted to the study: Wine Atlas, 2015

Descriptive statistics for variables performance that was used for the analysis in 2014 is given in Table 6. The correlation between the observed performances is shown in Table 7.

Table 6. Descriptive statistics in the profit model of super efficiency in 2014 in thousands of RSD

Statistics (2014)	Net working capital	Retained earning	EBIT	Bookkeeping value of capital	Total assets	Total debt
Maximum	612,161	584,345	86,711	546,786	947,944	0.000075
Minimum	0	0	0	0	32,428	0.000002
Medium	353,693,4	264,922,1	36,252,75	226,056,7	321,250,9	0.000022
S.D.	167,380,2	174,806	24,414,87	163,867,3	253,013,5	0.000026

Source: The authors' calculations

Table 7. Correlation of analyzed performance in 2014

	Net working capital	Retained earnings	EBIT	Bookkeeping value of capital	Total assets	Total debt
Input	0	0	0	0	0	0
Net working capital	1	0.31100	0.60419	0.19136	-0.50594	0.51810
Retained earnings	0.31100	1	0.58571	0.92130	0.51101	0.04004
EBIT	0.60419	0.58571	1	0.67810	0.26279	-0.12607
Bookkeeping value of capital	0.19136	0.92130	0.67810	1	0.68955	-0.14652
Total assets	-0.50594	0.51101	0.26279	0.68955	1	-0.53997
Total debt	0.51810	0.04004	-0.12607	-0.14652	-0.53997	1

Source: The authors' calculations

Based on the analysis of descriptive statistics, data obtained for 2014 and as shown in Table 6 by observing the values of the standard deviation it is observed that the highest deviation from the mean value is in the case of total asset, which is in accordance with the drastically different values of production facilities and the number of plantings, as shown in Table 5.

Table 8. Descriptive statistics in the profit model of super efficiency in 2015 in thousands of RSD

Statistics **(2015)**	**Net working capital**	**Retained earnings**	**EBIT**	**Bookkeeping value of capital**	**Total assets**	**Total debt**
Maximum	600,720	775,822	92,612	771,092	1,098,132	0.00008
Minimum	0	0	0	0	56,061	0.00000
Medium	388,317,3	305,597,3	30,305,92	256,026,9	371,362,5	0.00002
S.D.	149,562,6	211,453,6	28,687,17	210,865,2	259,842,1	0.00002

Source: The authors' calculations

Table 9. Correlation of analyzed performance in 2015

	Net working capital	**Retained earnings**	**EBIT**	**Bookkeeping value of capital**	**Total assets**	**Total debt**
Input	0	0	0	0	0	0
Net working capital	1	0.49053	0.38179	0.36572	-0.26729	0.40533
Retained earnings	0.49053	1	0.54834	0.96997	0.66618	-0.03656
EBIT	0.38179	0.54834	1	0.54335	0.27992	-0.19551
Bookkeeping value of capital	0.36572	0.96997	0.54335	1	0.75023	-0.06833
Total assets	-0.26729	0.66618	0.27992	0.75023	1	-0.42992
Total debt	0.40533	-0.03656	-0.19551	-0.06833	-0.42992	1

Source: The authors' calculations

By analyzing the data obtained by descriptive statistics for 2015 and presented in Table 8, we can see that the values of the standard deviation show the highest deviation from the mean value in the case of total assets, as was the case in the previous year.

In line with the general trend of improving macroeconomic activity of RS sector of production and processing of wine, in 2015 it recorded better performance compared to 2014. With further growth of liquidity and improvement of the companies' efficiency, the improvement of analyzed performance measures is also expected in the future.

The analysis of Pearson's correlation coefficients in 2014 and 2015 is presented in Tables 7 and 9 showing the strongest correlation between the ratio of retained earnings and book value of equity of 0.92 and 0.97 respectively, which indicates almost concurring movement of these two values. The amount of total assets and the total amount of debt showed the strongest negative correlation ratio of -0.54 and -0.43 respectively in the observed years.

Based on the observed effect of the wineries in 2014 and 2015, super-efficiency for each winery is calculated, as shown in Tables 10 and 11. In order to calculate the overall efficiency results we used output-oriented DEA model of composite indicators (*Model Name = DEA- Solver Pro. V13.0/ Super-Radial (Super-CCR-O) Returns to Scale = Constant (0 =< Sum of Lambda < Infinity*), whereat the input is 1 and the outputs are: net working capital, retained earnings, EBIT (earnings before interest and taxes), the book value of capital, total assets and total debt.

Table 10. Super-efficiency according to the DEA model of composite indicators in 2014

Rank	Name of the winery	Score
1	"VINARIJA ZVONKO BOGDAN" LLC Subotica	1.91111
2	LLC "VINARIJA KOVAČEVIĆ" Irig	1.55419
3	"PODRUM RADOVANOVIĆ" LLC Krnjevo	1.38527
4	"TOPLIČKI VINOGRADI" LLC Gojinovac	1.06610
5	"VINEX GROZD" LLC Belušić	0.85714
6	"STATUS" LLC Svrljig	0.83851
7	"VINARIJA ALEKSANDROVIC" LLC Vinča	0.80149
8	PTK "KLJUC" SC Kladovo	0.72130
9	PIK Oplenac LLC Topola	0.61669
10	"VINARIJA ALEKSIĆ" LLC Vranje	0.57640
11	Bogunović LLC Beograd (Zemun)	0.56815
12	Radiša Mladenović entrepreneur "MATALJ" Negotin	0.53718

Source: The authors' calculations

Table 11. Super-efficiency according to the DEA model of composite indicators in 2015

Rank	Name of the winery	Score
1	"VINARIJA ZVONKO BOGDAN" LLC Subotica	2.20104
2	LLC "VINARIJA KOVAČEVIĆ" Irig	1.41125
3	"TOPLIČKI VINOGRADI" LLC Gojinovac	1.21654
4	"PODRUM RADOVANOVIĆ" LLC Krnjevo	1.21495
5	"VINEX GROZD" LLC Belušić	0.93595
6	"VINARIJA ALEKSANDROVIC" LLC Vinča	0.83062
7	"STATUS" LLC Svrljig	0.73152

Rank	Name of the winery	Score
8	PTK "KLJUC" SC Kladovo	0.68247
9	PIK Oplenac LLC Topola	0.65848
10	"VINARIJA ALEKSIĆ" LLC Vranje	0.62736
11	Bogunović LLC Beograd (Zemun)	0.52771
12	Radiša Mladenović entrepreneur "MATALJ" Negotin	0.51623

Source: The authors' calculations

According to data from Tables 10 and 11 in 2014 and 2015, the dominant position in terms of super-efficiency realized the "VINARIJA ZVONKO BOGDAN" LLC Subotica with a score of 1.91 and 2.2 respectively. If the mentioned score obtained is observed independently of the liquidity ratio and turnover ratio it can blur the image on the performance of the enterprise to creditors. For this reason, decision-making is not advised based solely on the assessment of super-efficiency without the traditional analysis of fundamental indicators.

In further analysis, we grouped wineries into three categories: with the index of the super-efficiency lower than 60%, with the index in the range of from 61% to 99% and the index greater than 100%, Table 12.

Table 12. Index of super-efficiency of small wineries

Statistics	*2014*			*2015*		
	Frequency	*Percentage*	*Cumulative percentage*	*Frequency*	*Percentage*	*Cumulative percentage*
eff < 60%	3	25.00%	25.00%	2	16.67%	16.67%
61% < eff < 99%	5	41.67%	66.67%	6	50.00%	66.67%
>100%	4	33.33%	100.00%	4	33.33%	100.00%

Source: The authors' calculations

Based on the data in table 12, there is a tendency of increasing the index of super-efficiency of wineries from the zone 61% to 99%, for 20%.

Conclusion

Wine growing and enology may represent a significant part of the development potential of Serbia and thus, more attention should be paid on the industry.

By optimizing working capital wineries affect the reduction of the level of employed capital, release financial resources faster, increase liquidity, and therefore increase the overall value of the company. If wineries are successful in optimizing receivables and inventories they will achieve greater efficiency. In practice, it is difficult to achieve an optimal level of receivables and inventories and therefore companies often resort to the deferment of payment of their due debts. Financial indicators cannot directly provide answers to important questions about a winery, but on the basis of the relationship between the obtained indicators, comparing achieved performance and certain operating standards, we have identified certain differences and variations.

For making optimal decisions it is necessary to look at different aspects of the analysis. In fact, without the analysis of fundamental ratios it is not possible to make an unambiguous conclusion by the application of solely DEA model.

To obtain a true image of the efficiency of the wineries the research should be expanded on the wineries that belong to micro enterprises which are the most numerous in the Republic of Serbia. Therefore, to the stakeholders in the emerging markets it is recommended that analyses are not performed individually, but using a multidimensional coverage of various performance measures of the companies.

Winery owners need to keep in mind that if they want to achieve good results they have to engage managers who know that with the help of various tools of financial analysis they can get an abundance of useful information out of the financial statements relevant to the success of the wineries. Top management of the wineries is the one that should initiate appropriate measures which may lead to the performance correction of wineries.

Conflict of interests

The authors declare no conflict of interest.

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CHALLENGES FOR AGRICULTURAL POLICY IN THE SERVICE-DRIVEN ECONOMIC SYSTEM

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ABSTRACT

During last decades the essential shift occurred in the structure of the economy from industrial product-driven to the post-industrial service-driven economic system. A growing number of manufacturing firms throughout the world are shifting from selling goods to offering more and more services alongside their products. This movement is termed the "servitization". The movement is pervading almost all industries but still is weak in agriculture. The aim of the paper is to draw an agricultural sector-specific picture of servitization and discuss the differences between the business models of product-driven and service-driven farms. Servitization of farming is a transformational process that requires rethinking all aspects of the business: production structure and methods, marketing, pricing, service delivery infrastructure and financial management. The aims and means of current agricultural policy should be transformed in accordance with the emerging new business vision of the post-industrial farmers' generation. The article analyses the needs and perspectives to develop agricultural policy in line with the success factors of the service-driven economic system and highlights the main new post-industrial rural policy trends, which corresponds to the needs of new farmers' generation oriented towards servitization of farming in the new programming period after 2020.

Introduction

The 21st century is often described as a stage of post-industrial or knowledge society, where people found themselves in a world of totally different values, compared to the several centuries lasted industrial era. In the present stage of the post-industrial society the factors of economic success are essentially different from those in the industrial society, with the difference being as great as between the factors affecting the economic success of the agrarian and industrial society. This stage began when the service

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sector have started to dominate in the economic system. These changes can be clearly illustrated by an example of data of the Organization for Economic Cooperation and Development (OECD) – service sector of 16 OECD countries amounted on average 39 percent in economic structure in the years 1950–1960 and in the next years of 1990–2000 increased until 70 percent, when the share of the agrarian sector has decreased from 25 percent until 4 percent in the same periods (OECD, 2006). Changes occurred not only in the traditionally classified economic structure. In the last decade of 20th century revealed new tendency to provide services not only by specialized service companies but also by industrial or agricultural enterprises. This new tendency to organise business was called "servitization". The term "servitization" was mentioned firstly in the article "Business servitization: increase of the value by increasing the volume of services" in 1988 written by S. Vandermerwe and J. Rada. Subsequently, this concept has become more and more widely used in academic and professional business literature, and has become one of the most popular newcomers describing the 'new economy' over the last couple of decades.

The servitized economy forms a new stage in the development of society, essentially different from the previous one – the industrial stage. Disparities in the post-industrial stage are becoming more and more evident every day and can be compared to the previous major transformation of the economic system development from the agrarian to the industrial stage, so-called 'industrial revolution'. However, the concepts of the industrial economy are still used while analysing activities of the agricultural sector and innovations related with specifics of the post-industrial stage are not defined as servitization of farming. For example, all efforts made by farmers to apply new business models to respond to the needs of consumers for fresh, locally produced food are defined as the desire to shorten food supply chain. However, the business model when farmers take direct sales in order to reduce the number of intermediaries involved in the supply chain are fundamentally different from the transformations of the business model when an industrialized agricultural producer implement 'product plus service' system instead supplying their products to an anonymous food market.

The aim of this paper is to draw an agricultural sector-specific picture of servitization and discuss the differences between the business models of product-driven and service-driven farms, also to analyse the needs and perspectives to develop agricultural policy in line with the success factors of the service-driven economic system and highlight the main new post-industrial rural policy trends, which corresponds to the needs of new farmers' generation oriented towards servitization of farming in the new programming period after 2020.

Theoretical background

Although many developed countries in the world have been living in industrial economy for a centuries, the industrialization of the agricultural sector (in the literature of 2nd half of 20th century this phenomenon is often called as "modernization") have started not so long time ago. The authors of the economic history of agriculture say

that massive industrialization of agriculture has started only after the Second World War. Agrarian sector experienced a real revolution in developed (northern) countries due to the widespread mechanization, electrification, irrigation and chemization of agricultural processes (Clunies-Ross, Hildyard, 2013). Modernized agricultural production system was based on a specific economic logic that allowed ensuring stable farm income level by increasing overall production volume and technical efficiency of production (Van der Ploeg, 2000). The success of an industrialized farming system was based on a business model combining three production strategies: extensive growth, intensification and specialization (Vidickiene, Melnikiene, 2014). The extensive growth strategy was implemented by increasing the amount of financial capital used in agricultural production, thus achieving the growth of production volumes and gaining a scale effect. The strategy of intensification was implemented using work process automatization, Green revolution technologies and standardized production organization methods, which allowed producing more output with the same amount of resources, as industrialization of agriculture emphasized not only the productivity of the land as before but also the labour productivity and return on capital. In addition, industrialization of agriculture stimulated to decrease multifunctional activities. The specialization strategy was implemented by choosing to produce only those products that allow a particular manufacturer to gain a competitive advantage. Specialized farms started to plant fields with just one crop species at a time over a very large area. Meat, milk, and egg production became largely separated from crop production and involved facilities that housed a single breed of animal, during a particular period of its lifespan, for a single purpose (e.g., breeding, feeding, or slaughter).

At the end of the 20th century, the success of business model oriented to the scale effect, intensification of productivity and narrow specialization have ended. This was a result of the growing list of factors that have a negative impact on the attractiveness of farming. First of all, the dramatic increase in labour productivity and the use of monetary and agricultural policy tools have eliminated the food shortages in developed countries caused by the World War II. Even the overproduction of agricultural goods in world markets was created in the middle of the 8 decade of 20th century. By the end of 20th century, the increase in gross production volumes became undesirable, not only due to the saturation of markets, but also due to increased opportunities for the food industry to supply non-agricultural raw materials and an increasing opposition to the 'dump' prices for surplus of products in the world markets (Renting, 2003). Farmers have lost the incentive to produce according to principle 'as much as possible', while the extensive growth strategy has become ineffective.

Another important factor decreasing the attractiveness of farming was constantly increasing costs of production; it reduced the opportunity to gain a huge leap in productivity by implementing an intensification strategy as it was at the beginning of industrialization. This is related partly to the 'technological treadmill' (Cochrane, 1979), pressing farms to invest continuously in new technologies so as not to lose out in the race for the lowest production costs. In addition, higher cost of production was

a result of increased requirements for quality of products requested of food industry and retailers. Access to the market has become increasingly dependent on the farmer's ability to meet the criteria for product diversity and presence, flexibility to supply products and the availability of higher-quality product labels (Renting, 2003).

The third factor related with growing requirements for nature protection. Farmers were forced to make additional investments each year to comply with newly introduced environmental standards, animal welfare standards and sanitary measures. Farming strategy when one standard product is produced by intensive ways has been recognised as causing environmental damage and being criticized. This raised doubts about the benefits of a specialization strategy.

The fourth factor was the growing dynamism of the business environment. In the past, problems caused by the dynamism of the environment were most important in the manufacturing and service sectors, but in the last decade of the 20th century, farmers began to encounter new challenges related to the uncertainty of business conditions and the constant change of the current situation. In the1990s many developed countries have started to implement a free market and free trade model in their countries and activities in agriculture became even more risky. In particular, it was especially painful for specialized farms that produced mass agricultural products for export. Climate change is also a growing risk determinant to agricultural businesses.

The fifth important factor in reducing the attractiveness of farming was the globalization of the economy, which made the success of farming dependent not on personal efforts but on changes in liberalized markets for food, energy and other agricultural commodities. In addition, globalization of the economy has opened up new opportunities for developed countries to get cheaper food. For farmers from countries with a high standard of living have become difficult to compete with countries where expenditure for labour is very low.

All the above-mentioned factors reduced the viability of farmers' farms at the beginning of 21 century. According to M. Mazoyer and L. Roudart, "for the immense majority of the world's peasants, the international prices of basic food products are far too low for them to support themselves and renew their means of production, much less allow them to invest and grow" (2006, p. 14).

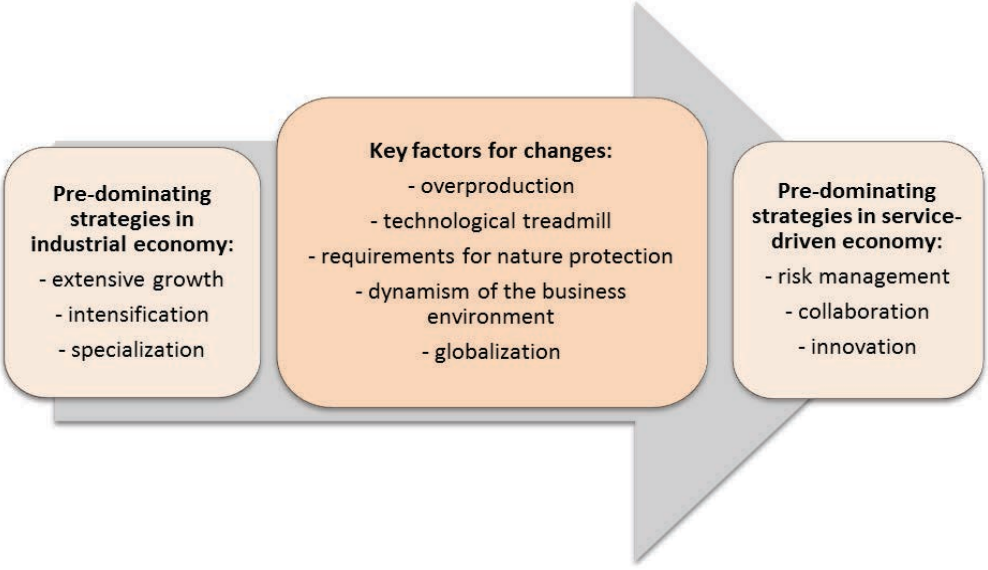
Rural policy has faced the challenge to find new measures to support the sustainability of farms. Aiming to reduce the growing risk of farming, new agricultural policy measures were introduced for farmers to change strategy of specialization to the strategy of diversification. Various combinations of activities were supported, using both related and unrelated diversification. However, the strategy of diversification of farming activities for some farmers has not become an effective tool for making a return from farming more safe. Assessing the growing impact of the above listed factors, they begin to consider farming as a risky and unattractive activity. Results of empirical studies show the situation that in the developed countries in the last two decades is not only the lack of successors to family farms, but also the lack of individuals who wish to take farms of retired farmers (Baker et al., 2016; Chiswell, 2012; Uchiyama et al., 2008).

By our opinion, it should be responded to the challenges of the post-industrial society in the agriculture by gradually changing the dominant product-driven business model into a service-driven business model. The goals and means of the current agricultural policy should be transformed in line with the emerging new service-oriented farming business vision, since individual farmers or small groups of farmers do not have the capacity and ability to resist global food markets.

Results

Servitization in manufacturing companies is already widely and thoroughly studied in scientific literature (Lightfoot et al., 2013). Unfortunately, in contrast to the researchers, being active over the past three decades in creating of business models that integrate products and services of the companies and analyzing their success factors, researchers focusing their research on agribusiness and food industry are still giving little attention on business models in agriculture, assessing their sustainability and innovation (Ulvenblad et al., 2014). Although recently the issue of the sustainability of the agricultural sector has been analyzed very often, research is not oriented to promote innovative business model of farming by shifting from the "product-driven" to a "service-driven" model and focusing on predominant strategies in service-driven economy (see Figure 1).

Figure 1. Factors influencing changes in predominating strategies of industrial and service-driven economies.



Source: created by authors.

Although the research is lacking on business servitization processes in agriculture and in other activities of farmers, it can be argued that a group of farmers is emerging, called the 'new farmers' generation', aiming to find alternatives to the business models established

during the industrialization of the agricultural sector in the servitization framework. At the beginning, the vision of business model of a new farmers' generation was based on willingness to shorten food supply chain, by creating farmers' markets and starting direct selling of farm products to the end-users (Coster, 2004; Coster, Kennon, 2005; Guthrie et al., 2006). During the period of industrialization of agriculture, many intermediaries as processors, warehouses, transporters, and traders stepped between the farmer and end-users of their food products. Extremely large part of households in developed countries began to buy food at supermarkets, and purchasing food in farmers' markets became increasingly unpopular. Increasing number of intermediaries in the food supply chain had a profound impact on farmers' incomes. If in the sixties and seventies farmers received 40–50 percent of the food prices set by supermarkets, the share of farmers in developed countries since eight decade of the 20th century is usually not more than 10 percent (Guthrie et al., 2006). The new generation of farmers has started new initiatives to develop alternative local food markets, revitalizing traditional farmers markets in cities, creating shops in their own farms, delivering food to the customer's home or workplace, etc. However, many such initiatives have failed, as small groups of farmers did not have the capacity and ability to resist global food markets.

However, it is important to note that the business model when farmers take direct sales in order to reduce the number of intermediaries involved in the supply chain are fundamentally different from the business model when a farmer creates long-time customer relationships by implementing 'product plus service' system instead supplying their products to an anonymous food market. In our opinion, the efforts made by farmers to apply servitizated business models to respond to the needs of consumers for fresh, locally produced food has a big potential. Although many farmers are using a simple business model for farming servitization by offering to produce desirable food box and delivery it to the consumers home or office (product-oriented service), empirical studies indicate that farmers have started to use more complex systems as 'product plus service' or 'resource access plus service'. It can be rental of a fruit or kitchen-garden, where residents of the city get the opportunity to grow their own vegetables and fruits, and they are also constantly consulted on how to do all the necessary work. Community-based farming is also becoming more popular, when city residents partly finances a production process in the farm, or even engages in economic activities of farming from the very beginning of the production cycle with the aim to get products they want, and also to gain knowledge about agricultural production and spend their leisure time in the way interesting to them. There are also B2B models of service provision where small farmers provides services to the large farmers, for example, a special species of chicken are hatched on request, and then small farmer take them to a large farm, where they carry out further operations in the production cycle: growing up to the time of sale, slaughtering and selling. It allows to improve the quality of the agricultural products, to use more environmentally friendly technologies and to produce food products that is more nutritious for human health (Baluch et al., 2017). Servitized model is used in livestock sector (Pereira et al., 2016), crop protection (Pereira et al., 2018), etc. There is

a growing demand for proposals of companies that have started use servitized business model and produce various agricultural machinery, to lease rather than buy farming equipment according to the needs of farmers (Corti et al., 2013). In successful cases the transformative power of business model innovation is really impressive.

Discussions

The history of economic system evolution indicates that it is not enough to focus on the technological innovations. Another important direction is development of innovative business models. Aiming to increase the productivity of workers in the beginning of the 20th century, an unprecedented jump was reached by applying F. Taylor and his followers' theory of "scientific management". In this century it is important not only the increase in labor productivity, but also the reduction of business risk, as the widespread use of information and communication technologies has not only high positive influence on the productivity, but also undesirable consequences. New opportunities to get requested information immediately and ability to manage this flow using modern information and communication technologies have created an extremely dynamic business environment and all previous business risk management practices have become ineffective. Services can be attributed to the least risky products, and their demand is growing. As a result, manufacturing companies are focusing on servitized business model aiming not only to increase its revenue, profit margin and the scale of sales but to create the opportunity to obtain loyal consumers and reduce the number of competitors. The fact that the financial crisis in 2008–2009 has streamed the business orientation towards the development of services, confirms the hypothesis that instability and unpredictability of the business environment are very important, if not the most important, factor for servitization of manufacturing and agriculture sectors.

Recently, scientists have started a discussion whether it is necessary to encourage entrepreneurs to create new businesses focused on new types of perspective services by increasing the tertiary sector, or to maximize the servitization of industry and agriculture activities. Research shows that the first path requires more social costs (Crozet, Milet, 2017). Therefore, a priority should be given for economic policy measures to promote the servitization of the production process in the manufacturing and farming.

Unfortunately, in the current documents defining agriculture and rural development in the EU, the term 'servitization' is not mentioned at all. Although new farmers' generation become an important organizational force for the development of the rural economy and community (Hewitt, 2009), there is given little attention to the interests and vision of farming of this generation when planning financial support tools. The new farmers are proposing completely different and innovative business models but their approach is not considered as an important factor that can influence the changes in culture of eating important for health of people, more careful use of natural resources and vitality of the countryside in the 21st century. Although one part of the ideas of new farmers initiatives are in line with the EU programme requirements for the European Innovation Partnership (the EIP), aiming to promote a short food supply chain and

diversification, creation of rules for the support measures were based on an industrial product-driven business model that focus to provide products for the anonymous market. Therefore, many steps needed to move to a service-driven business model are considered to be irrelevant to increase farm sustainability and are considered as not eligible for funding.

In our opinion, the EU needs to develop agricultural policy in the new programming period after 2020 in line with the success factors of the service-driven economic system, which corresponds to the needs of new farmers' generation oriented towards servitization of farming (Gedminaite-Raudone, Vidickiene, D., 2018). Servitization of farming is a transformational process that requires rethinking all aspects of the business: production structure and methods, marketing, pricing, service delivery infrastructure and financial management. Transition to a service-driven business model requires radical changes in the paradigm of agricultural and rural development policies. Summarizing the latest research on the serviced business model in the manufacturing sector (Kindstrom, 2010; Reim, 2015; Foss, Saebi, 2017) and the latest rural paradigms (networks, post-productive agriculture and rural development, endogenous rural development, place-based rural development), it is possible to assume that the greatest potential to help implement service-driven business vision of the new generation of farmers' by economic policy measures is to support the use of collaboration strategies (Vidickiene, 2018). Researches that analyse the success factors in the shift of manufacturing companies to services demonstrate that in the service economy the most important is coordination of all the stakeholders and not previously important factors as the investment, the new production technologies and the specialization of employees. Most failures in implementing a service-driven business model are related to lack of collaboration with consumers. The collaboration is especially big challenge to farmers because the supply chain has become longer and they have lost their connection to their final consumer over the past half century. Therefore, the most important area requiring state aid becomes facilitation of tools for coordination of relations between economic actors. This means that support mechanisms must be based on the latest management theories emphasizing the business model based on the paradigm of co-creation (Ramaswamy, Ozcan, 2014) in service provision, where a part of the new value is generated not by services provider but by the clients. The degree of inclusion of a service consumer in a newly created value can be varied, but the service provider always makes their own contribution. Considering this fundamental change in the value creation process, the key future objective of improving the EU's agrarian and rural policies is to provide support measures to innovative cooperation between farmers, as service providers, and their consumers. The key to success should become the implementation of a variety of new collaboration models reducing farming risk and generating synergetic effect by value co-creation.

Conclusions

1. New generation of farmers have emerged in the 21st century aiming to find alternatives to the business models that existed during the industrial stage of the agricultural sector development.

New farmers' generation often is described as a group of innovative farmers that focuses on totally different lifestyle and new livelihoods appeared in post-industrial business environment. It can be argued that the business vision of a new generation has a great potential because it is based on the success factors of post-industrial economy focused on service-driven business model.

2. Conservative policy-makers are quite sceptical about the ideas and opportunities offered by the new generation of farmers to create a sustainable source of income for the food made to order or other services. To a large extent, this is due to a lack of clear and scientifically based guidelines how to organise a servitized business model, components if this model and which strategies can be most effectively used for it in the current business environment.

3. The use of various government programs supporting innovative service-driven business farms can become an effective tool helping not only to develop agriculture and the economy of rural regions, but also to build a new, socially responsible culture of consumption, by development of healthier eating and eco-friendly lifestyle habits.

Conflict of interests

The authors declare no conflict of interest.

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POSSIBILITIES FOR DEVELOPMENT OF COMMODITY EXCHANGE IN SERBIA

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ABSTRACT

The aim of the paper is the analysis of the current situation related to the spot and non-standardised term commodity exchange market, as well as to provide a proposal for further improvement of commodity-trading in Serbia. The system of commodity-exchange trading in Serbia has not been developed and legislation has not been fully enacted. According to the analysis of price variability on three commodity markets it can be concluded that the fluctuations of prices of agricultural products in the last decade were very high, which led to market participants' need for term commodity exchange instruments. The paper presents suggestions for further improvement of the spot market as well as the clearing model on the forward market. The adoption of the Law on Commodity Exchange and amendments to the Law on Capital Market would improve the spot trading, trading of non-standardised and standardised term contracts.

Introduction

The commodity exchange is an institution that organises trading of goods and securities derived from commodities. On commodity exchanges both type of transactions can be organised, daily spot and term trading (Weber, 2000).

Spot trading is characterised by buying and selling commodities with delivery immediately after the conclusion of trading transaction. Spot trading in agricultural products is of low volume and rarely present on developed commodity markets. Term trading is related to delivery of goods in the future period. There are two types of term contracts - non-standardised and standardised (Working, 1953; Jayne et al., 2014).

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Spot (daily or prompt) markets of commodity exchanges allow traders to purchase and sale goods safely and transparently within delivery in a few days. Spot commodity trading, in addition, is improving trading security and inventory management of agricultural products[4], provides a very important function of price discovery, i.e. all participants in the market of agricultural products are allowed to see the realised trading price (Vavra, 2009).

Non-standardised term contracts, forwards, on agricultural products are traded on the Novi Sad Commodity Exchange, while this type of trading on worldwide commodity exchanges has relatively small volume.

Forward contracts are individual, not standardised in terms of quantity and delivery terms, which as a result has, as a rule, limited secondary trading (Kleinman, 2001; Kolb, Overdahl, 2007). Forwards, often called "green contracts" in domestic practice, are usually traded Over-the-counter (OTC) (Kovačević, Milošević, 2017). Futures and options are characterised by high standardisation in terms of timing of delivery, quantity of goods, place of delivery, etc. (Stošić Mihajlović, Zdravković, 2016).

Given the fact that forward contracts transactions are terminating in the future, there is a real possibility that by the timing of delivery of agricultural product the prices will change and one of the traders will suffer a loss. The possibility of a loss on a forward contract creates a risk of withdrawal from the execution of the contract of the losing party. In order to prevent withdrawal of contracting party from the forward contract, as well as the realisation of the counterparty risk, for reliable trading in forwards there is a need for a clearing house. It allows the depositing of guaranty deposits, so called margins, for each of the participants. The trader is obliged to deposit in the margin account in the case of unfavourable price movements and fall of the account coverage below a certain level (Kovačević, 2013; Jeločnik, 2017).

Forwards generally carry a high level of counterparty risk that shades contracts' execution in the future. In a situation in which the price of an underlying agricultural product is changed, a trading party that is generating loss i.e. can more favourable sell/buy the product in the spot market, has a motive not to execute the contract. The forward's feature is to be used for actual physical delivery of goods. They are not standardised that is an advantage as they are tailor-made to the traders' needs. On the other hand, this is also a disadvantage because secondary trading is limited (Geyser, 2000).

The most often short positions in forwards are held by agricultural producers and other actors in trade who are in possession or expect to be in possession of an agricultural product until the maturity of the contract (Harwood et al., 1999). In the situation when the buyer generates profit, the seller records the loss in the same amount and vice versa. The seller's profit is equal to the loss of the buyer. Based on this, it can be concluded that the sum of all gains on the forward market for agricultural products is equal to the sum of all losses (zero sum game).

4 Products on the commodity exchange are constantly available, thus, it is not necessary to keep high inventories.

Forwards on agricultural products serve as instruments for managing the price risk (hedging strategies). Spot commodity trading is in decline on modern commodity exchanges, while the Commodity Exchange Novi Sad is one of the few commodity exchanges in the world that has retained a significant trading volume. According to the representatives of the Commodity Exchange Novi Sad trading volume is maintained due to a constant reduction in the exchange commission. The reasons that cause the disappearance of the spot commodity-exchange trading in agricultural products are listed in the next table (Table 1).

Table 1. Factors affecting the volume of spot commodity-exchange trading

Factors that positively affect the development of spot commodity-exchange trading of agricultural products	**Factors that negatively affect the development of spot commodity-exchange trading of agricultural products**
Limited transport system (based on railway)	Development of flexible truck transport
Poor ability of communication between buyers and sellers, which makes it necessary for the two sides to meet in a centralised market	Development of IT facilitates the direct contact between buyers and sellers avoiding the need for direct meeting in a centralised market
A poor system of product standardisation, which determines the need for immediate control of goods by the buyer, on-site	Development of quality standards and quality control systems, which enables trade of goods according to product description
Small scale production by a large number of non-specialised producers (increasing the cost of direct purchase)	Production consolidation and the possibility of direct purchase of large quantities of goods directly from the producer
Domination of small traders that procure smaller quantities of goods on central market	Emergence of large traders who can directly order large quantities of goods

Source: Authors' presentation based on Kohls, Uhl, 2002.

According to the previous table, the spot commodity-exchange trading (centralised market) loses its significance primarily due to the development of transport and telecommunication media that allow traders to contract fast delivery without the cost of a commodity exchange. It is important to note that the spot commodity market is more sensitive to the costs of exchange trading than the stock market for two reasons: firstly, supply and demand for agricultural products are more easily meeting outside the exchange than, for example, trading in shares and bonds, and secondly, after matching the orders the commodity must be transported to the standardised place for delivery of the commodity exchange, which increases the costs[5], unlike, e.g. dematerialised shares that are only electronically transferred to the new owner.

Spot commodity-exchange trading is losing its significance, while term commodity-exchange trading gains in significance. Thus, from year to year world commodity exchanges record an increasing volume of trading on the term market.

5 In order for goods to be traded on commodity exchange, supply does not contain information where goods are located, but the rules of the exchange define the place of delivery, most often river or sea harbor. In practice, this transportation does not occur. Direct delivery is made following the shortest route to the buyer, while from the seller the amount of transport costs to the standardised exchange point of delivery is deducted, which represents a significant expense.

Regarding the legislation, there is a significant difference between spot and non-standardised trading on one hand and standardised term trading on the other. There is a difference between the legislation regulating the spot and forward commodity market and trading of derivative securities (options, futures and swaps). Within the EU, spot trading legislation is not subject of common EU regulations, thus each EU Member State regulates this area individually. In the case of derivative securities, common EU regulations have been established, where all EU member states must be harmonised. On the other hand, path for the development of commodity-exchange operations in Serbia is to improve the existing spot trading and establish term trading (Veselinović et al., 2014, Kovačević, Vasiljević, 2017, Kuzman et al., 2018).

Commodity Exchange Novi Sad is the only commodity exchange in Serbia that for several decades organised the spot trading, while the term trading with forward contracts has relatively small presence and faces a high degree of risk.

In previous decades, extreme price volatility of agricultural products on commodity markets worldwide have been an important topic for analysis, as it is usually connected to insecurity and financial risks for all actors within the supply chain (FMFA, 2015).

Price fluctuations are primarily the result of the mutual confrontation between the parameters of food availability (e.g. weather conditions, planned production volume, policies turned to public incentives, previous supplies, foreign trade trends, length of market chain, state of elements of market infrastructure, legislation, etc.) and the macroeconomic factors to the current demand (e.g. rates of population and GDP growth, purchasing power, general level of employment, presence of inflation, quality of available food and income distribution, etc.), (Erokhin, 2017). Significant price fluctuation of agricultural products caused the need for establishment of economic instruments that will enable managing the price risks. It was provided by development of commodity and financial derivatives during the 1970s (Zakić, Vasiljević, 2013).

Materials and methods

Given that the fluctuation of agricultural products prices represents one of the key drivers of the development of modern commodity markets, the price of corn is analysed in order to reach a conclusion on the need to establish more developed commodity-exchange operations for participants that trade in cereals.

In order to demonstrate the increasing need for improvement of spot trading and development of term trading on commodity exchange in Serbia, in this paper, in addition to in-depth interview with relevant experts within the field of commodity exchanges and risk management models in agriculture, authors referred to the data set on corn trading on three relevant international commodity exchanges: CME (Chicago Mercantile Exchange, USA), MATIF (Marché à Terme International de France, Paris) and Commodity exchange Novi Sad (Serbia). Data series variability was calculated in order to determine the need of hedging strategies for Serbian farmers. Linear regression is applied in order to identify the trend at Commodity Exchange Novi Sad trading volume behaviour.

The rational for using corn prices is the fact that corn is the one of the most relevant commodity exchanges trading material. Furthermore, corn prices are taken from CME because it is the largest commodity exchange in the world and those data are considered as a ‘‘global corn price’’. On the other hand, MATIF data are used due to the fact that this is the largest commodity exchange in Europe with significant effect on Serbian grain prices. Commodity exchange Novi Sad is only commodity exchange in Serbia and its price information are most relevant for local market.

Results and Discussion

Data encompass daily closing prices for corn in USD/t. Available time span differs for each series: 3 Jan 2007-25 May 2018 for Commodity Exchange Novi Sad data, 13 Jan 2010-25 May 2018 for CME data and 12 May 2011-25 May 2018 for MATIF data on corn prices.

Figure 1. Corn prices on the Commodity Exchange Novi Sad, CME and MATIF, in the period 2007-2017, in USD/t

Source: Commodity Exchange Novi Sad, 2018a; CME, 2018; MATIF, 2018

In previous chart are presented the corn prices recorded on the Commodity Exchange in Novi Sad, CME and MATIF. What could be noticed is the significant variability of the corn prices on all three markets, that determines the need for the development of the term commodity trading on Serbian market, too (it already exists on CME and MATIF). That would enable traders of agricultural products to apply hedging strategies in order to protect their income from price risks.

The need for a term market in order to manage the risk of adverse movements in prices of agricultural products in the future is directly proportional to the fluctuation of the prices of agricultural products. With higher price fluctuations farmers will have a greater need to sell their products while they are still on the field, for the delivery in the harvest period (Madre, Devuyst, 2016).

In order to determine and confirm the needs of farmers in Serbia for the developed term market for agricultural products, an analysis of the fluctuation of corn prices in the period 2007-2018 was carried out.

Table 2. Measures of the corn price variability in Serbia, in period 2007-2018

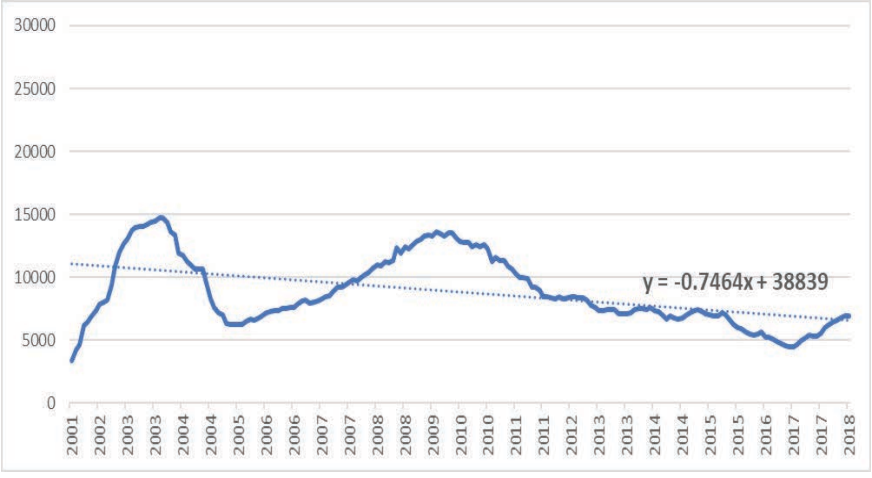
Serbia	Corn price
Standard deviation	55.31
Variance	3,059.14
Average	192.77
Coefficient of variation	0.29

Source: Authors' calculation

The fluctuation of corn prices in the observed period is highly significant and there is almost no other sector of the economy in which this level of price fluctuation exists.

Figure 2 presents the trading volume on the daily spot market at the Commodity Exchange in Novi Sad (trade with corn, soya, wheat, etc.). It could be noticed that the trading volume has a mildly declining but almost stagnant trend.

Figure 2. Volume of trading on the Commodity Exchange in Novi Sad (in thousands of tons), in the period 2001-2018



Source: Commodity Exchange Novi Sad, 2018b.

The Commodity Exchange Novi Sad in Serbia is one of the rare exchanges trading forwards. In next table (Table 3) is presented the total volume of forward trading at the Novi Sad Commodity Exchange. Since in literature there is no clear division between the spot and forward contracts in respect of delivery time, for the purposes of this paper analysis, in forwards contracts are classified all the contracts with a delivery longer than thirty days.

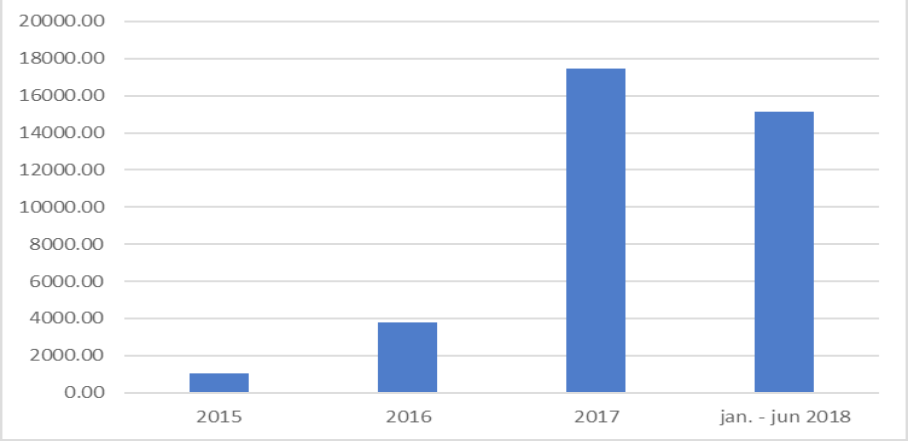
Table 3. Number of forward contract traded on Commodity Exchange Novi Sad, in the period January 2015 - June 2018

Year	Number of contracts
Jan -June 2018	52
2017	60
2016	21
2015	5

Source: Commodity Exchange Novi Sad, 2018b.

According to the data from previous table, it could be seen that although relatively negligible trade is recorded, there is significant increase in number of contracts traded within the observed period.

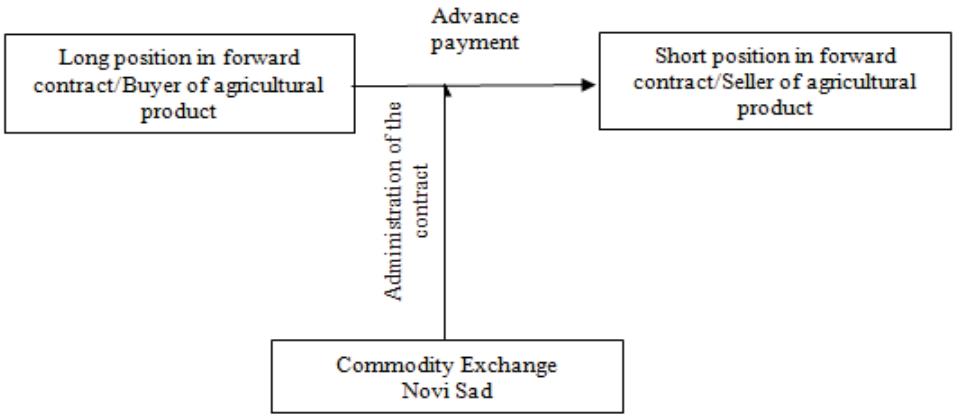
Figure 3. Total volume of trading in tons on forward contracts on the Commodity Exchange Novi Sad, in the period January 2015 - June 2018



Source: Commodity Exchange Novi Sad, 2018b

For the analysed period, both the number and the quantity of agricultural products in forward contracts have been significantly increased, indicating that farmers have a pronounced need for a timely and secured sale of agricultural products.

Figure 4. Mechanism of term trading of agricultural products on the Novi Sad Commodity Exchange



Source: Authors' presentation

According to the above scheme, after the conclusion of the forward contract, the buyer pays the full amount to the seller. The Commodity Exchange Novi Sad administrates all operations related to the conclusion of the transaction, such as: order announcement, matching of orders, contract notes for the orders executed, informing traders, etc. There is no guarantee of fulfilment of the contractual obligation of the seller. Thus, after the complete purchase price is paid there still remains the risk of avoiding the delivery of goods by the seller. The counterparty risk is the basic lack of this type of trading, as well as primary obstacle for the development of the non-standardised term market in Serbia.

In line to the findings in this paper, on the spot market, commodity trading inherent to developed commodity exchanges, in Serbia has not been established.

Comparative analyses in Table 4 presents the current trading model on Commodity Exchange in Serbia, as well as characteristics of the models of developed commodity markets.

Table 4. Comparative analysis of the current trading model on the Commodity Exchange in Novi Sad and trading model characteristics of the developed commodity exchanges

Elements	Developed commodity exchanges	Commodity Exchange Novi Sad
Licensing and controlling the commodity market	Obligatory	Not established
Mandatory capital censorship for the operation of the commodity market	Established	Not established
Clearing and settlement system	Established	Not established
Licensing and controlling of the commodity market members	Established	Not established
Spot trading	Infrequently	Established
Trading of non-standardised term contracts (forwards)	Infrequently	Established with increasing trend

Elements	Developed commodity exchanges	Commodity Exchange Novi Sad
Trading of standardised term contracts (futures and options)	Established	Not established
Out-of-court dispute settlement system (commodity exchange arbitrage)	Established	Not established (traders in situation of dispute have to rely on court processes)
Guarantee deposit system that guarantees execution of the contract	Established	Not established

Source: Authors' presentation

Based on the comparative analysis, it may be concluded that the legal framework for the operability of the commodity spot market, which would define the system of licensing and control of commodity exchanges and thus improve the security of trading, has not been established in Serbia.

The "level of services" that the commodity exchange provides to traders is of high importance (UNCTAD, 2009). The level of services on the local commodity exchange is low because, after matching of exchange orders, the buyer and the seller receive information on each other and they have to take care about the delivery of goods and the payment (the clearing and settlement functions on the commodity exchange are not established). Draft Law on Commodity Exchange proposes that settlement and clearing should operate on commodity exchange throughout the specialised accounts so that commodity exchange takes care of the delivery and payment of goods. In that system the buyer transfers funds to the specialised account on the exchange, and not directly to the seller, as is now the practice, while the exchange after the receipt of the certificate of delivery of goods transfers the funds to the seller. In addition to increased level of commodity-exchange services, through clearing and settlement, the level of security in trading could be also raised (MTTT, 2018).

Besides the types of trading instruments and services level, trading security is the third pillar that determines the success of commodity market. In Serbia, in case of an exchange dispute, participants in trading are referred to the dispute resolution in regular court proceedings (there is no out-of-court dispute settlement established on the commodity exchange).

Furthermore, with regard to the security of execution of the contract, there are no guarantees established through deposits that are a precondition for listing of a trading order. In the spot trading, these deposits serve as a counterparty compensation in the event of the cancellation of the execution of the contract. In trading of non-standardised term contracts, currently, there are no guarantees for execution of contracts (margin accounts).

According to the previously shown results of the analysis in Serbia, a developed commodity market has not been established, since important elements of commodity exchange operations are missing.

In this part of the paper, the possibility of development of the spot and non-standardised commodity market will be analysed in more detail. Draft Law on Commodity Exchanges proposed by the Ministry of trade, tourism and telecommunications, which should regulate the mentioned area, is in the adoption procedure. This document defines only spot and forward trading, while the area of derivative securities is left to the authority of the Law on Capital Market. There is no legal framework for commodity exchanges in Serbia, despite the fact that the first draft law was initiated in 1992. So far, seven working groups have been formed in different ministries.

In line to the conducted analysis, the following areas for improvement of the legal framework related to spot and non-standardised term trading have been identified:

1. Introduction of the licensing system and control of the operations of commodity exchanges by the Security and Exchange Commission.
2. Introduction of clearing system on the commodity market, through a consolidated specialised account managed by the commodity exchange. Through the clearing function, additional services are offered to traders as well as a significant increase in security of trading. The practice has so far been that the buyer and the seller get information about each other and they themselves take care of the delivery while the payment is done in advance. This has caused a number of problems in practice, especially in cases when seller did not deliver the goods as agreed after the advance payment. In the new system, the buyer will pay the funds to a collective specialised account, while the commodity exchange will transfer the funds to the seller upon the reception of the evidence of goods delivery. In this way, without significantly raising the costs of trading, the service offered to traders by the commodity exchange will be greatly improved that may lead to significant reduction of risks.
3. Introduction of obligatory guarantee deposits in spot trading which are necessary to place the order in the quotation. In this way, trade security is increased and counterparty risk is reduced.
4. Introduction of the exchange arbitrage in situations of traders disputes.
5. In forward contracts trading, the introduction of required margin accounts for both parties, which are marked to market on a daily basis in the case of goods with a high volume of spot trading. The required amounts to be deposited are fixed on high level for goods traded with a small volume on spot market.
6. The possibility that margin on forward contracts may be deposited, in addition to money, in other forms of liquid assets such as: bank guarantee, government securities, etc., which significantly reduces the costs of trading.

Considering the fact that, a significant need to improve trading of non-standardised term contracts is noticed, a model for the development of non-standardised commodity trading is analysed in more detail in Table 5.

Table 5. The analysis of forward contracts trading on commodity exchanges

Advantages	Disadvantages
They are not standardised, allowing the buyer and seller to trade with the quantity and within the delivery period that suits both parties	They are not liquid, i.e. secondary trading is difficult, unlike the futures, and thus leaving the contract is not possible
It provides physical delivery of goods and do not face the basis risk as in the futures	High counterparty risk
Lower costs of guarantees for participants in trading in comparison to the guaranties in futures (there is no transfer of funds between the buyer and the seller, therefore, liquid assets can be used in addition to money, for example, bank guarantees, government securities, etc.)	Determining the price at which the forward is settled is complicated given the fact that there is no reference market price, as in the case of futures.
Forward trading does not require a high volume of trading as opposed to futures for which market liquidity is a prerequisite for maintaining trade.	

Source: Authors' presentation

A legal basis for the development of clearing on a non-standardised forward market is necessary, while the mechanism itself and the operation of clearing can be specified in the by-laws. Due to the importance of clearing for the successful forward trading on commodity exchanges, analysed and presented is a potential clearing mechanism (Table 6). The basic differences between clearing in a standardised and non-standardised markets are:

1. On a standardised market, the settlement price of a contract is known. Most often it is the last price of the contract at the end of the trading day, while in the forward market the price of the contract, based on which the guarantee deposits of traders will be settled (margin accounts), does not exist. Therefore, in the case of a forward, the settlement price of the contract must be calculated.
2. Standardised forward contracts are highly liquid and, in the case of a default of one counterparty, the clearing house simply closes the position of the defaulting party by selling the position. Forwards are individual and, therefore, less liquid than futures contracts, so in this case a position that is in a default cannot be sold and another solution must be sought to close this position.

Table 6. Proposal of the basic elements of clearing in the non-standardised term market

Elements	Clearing model activities
Calculation of the settlement price	Adding storage costs in the period up to the moment of delivery of goods on the daily spot price.
Liquidation of the defaulting position	Transferring a guarantee deposit from the party that is in a default to the other party in the contract.
The length of the contract maturity	Contracts should be active until the harvest (they could not last longer due to the difficulty in calculating the settlement price of a contract).
Guaranty deposits	All liquid assets - traders could deposit money, bank guarantees and government bonds. In the case of a seller, by placing a warehouse receipt at the commodity exchange, the obligation to lay down other guarantees would cease.

Source: Authors' presentation

In the Central and Eastern European countries, the term commodity trading in agricultural products has not been established[6]. The trading in this type of financial instruments is also very low in the EU compared to the USA and some Asian countries (Belozertsev et al., 2011). By establishing an efficient commodity-exchange system, Serbia could become a regional centre for commodity-trading for participants from countries that do not have the preconditions for establishing a commodity market.

Conclusions

Commodity-exchange trading has not been established in Serbia. Significant fluctuation of agricultural product prices during the last few decades is deriving demand for the development of term commodity-exchange which would allow market participants to apply hedging strategies in order to ensure the commodity price in the upcoming period.

On the spot market organised by the Commodity Exchange Novi Sad, trading is not characterised by features that are specific for the developed exchanges. There is no clearing system, exchange arbitrage, procedures for licensing and control of exchange market operations, etc.

Within the non-standardised trading organised by the Commodity Exchange Novi Sad, the buyer and the seller, after the conclusion of the exchange contract, have to take care about the delivery and payment of goods. There is no system of guarantees pledging that would guarantee that both parties will execute the contract in case of an unfavourable price movements.

The main reason for the underdeveloped commodity market in Serbia is the lack of harmonised legal regulations for spot commodity exchanges, as well as the non-harmonised Law on the Capital Market with common EU regulations in this field.

The Draft Law on Commodity Exchange is in the adoption procedure. The draft has defined a clear scope of jurisdiction for spot and non-standardised term trading.

It is necessary to introduce a simple mechanism of clearing based on the consolidated specialised accounts managed by the exchange. This system would allow the payment of funds to the seller after delivery of goods. By introducing this simple mechanism, traders receive a significantly higher level of security, as well as the level of services.

Legal regulation of the system of licensing and control of commodity exchange by the Securities and Exchange Commission would increase safety and uniformity in the operations of all commodity exchanges.

In the forward contracts trading, the obligation to place a guarantee amount on margin accounts should be introduced, which would create, for the first time in Serbia, a forward contract with the institutional guarantees of execution.

6 The trading of futures on the exchange in Budapest completely ceased.

Based on the analysis, it may be concluded that the adoption of the Draft Law on Commodity Exchanges and amendments to the Law on Capital Market would enable the development of commodity-exchange operations in Serbia. Given the fact that a large number of countries in the region do not meet the prerogatives to develop commodity trading, Serbia could become a regional centre. By amending and harmonising the Law on Capital Market, a possibility would be created for inclusion of Serbia's commodity exchange in the common futures market of cereals in the region.

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Conflict of interests

The authors declare no conflict of interest.

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SWOT ANALYSIS OF THE RURAL TOURISM AS A CHANNEL OF MARKETING FOR AGRICULTURAL PRODUCTS IN SERBIA

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ABSTRACT

In many countries, rural areas are undergoing significant socio-demographic and economic changes, and this trend is also present in Serbia. From the economic and demographic point of view, and this is particularly true for southern Serbia, the problem of depopulation, ageing and extinction of the village has arisen. The subject of this paper is rural tourism in Serbia, which is observed in the context of the new channel for marketing agricultural products of rural households and analyzed by SWOT methodology in order to capture all strengths, weaknesses, opportunities and possible threats. Results show that one of the highest priorities is the synthesis of agriculture and tourism in Serbia, which would be the basis for the development of diversification in rural communities. The development and advancement of the rural environment represent a sustainable and stable regional economic development.

Introduction

Current social and economic developments condition the migration of the population into urban environments. During the last century, massive urban migration was recorded for employment purposes, as a consequence of the development of the tertiary sector in developed countries and the secondary sector in developing countries. Also, modern agriculture is mechanized and requires an even smaller share of manual labour. As a consequence, today more than half of the population lives in cities, which has many advantages and disadvantages. From the economic and demographic point of view, and this is particularly true for southern Serbia, the problem of depopulation, ageing and

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extinction of the village has arisen. On the other hand, the urban population is exposed to problems of urban life, noise, pollution and exposure to stress, which leads to the occurrence of mental disorders such as anxiety and depression. One way of alleviating these bad trends is the development and affirmation of rural tourism. Economically, rural tourism enables the development of rural households, and tourists from cities provide an excellent opportunity to escape stressful life and stay in an authentic rural environment. For the sustainable rural agriculture it is necessary to develop the technology of crops production with achieving economic profitability, social and economic equity and environmental and food security the conclusion are Radosavac & Knežević (2017). Rural tourism can also be considered as an important component of the integral and sustainable development of the village, as it encourages local economic growth through the development of agricultural and non-agricultural activities, with the incentive for employment. Tourism development also provides opportunities for small agricultural producers to increase their revenues by selling surplus production to the local tourism sector and thus improve their standard. In turn, increasing the supply of local food products can have a positive impact on the tourism sector, as it builds an authentic tourist offer. Therefore, the establishment of links between the production of agricultural food and rural tourism can contribute to the economic development of the village, and in certain circumstances even confront the migrations of the population and capital.

Food industry occupies a high position in a competitive international tourism market, but it is not sufficiently developed in the field of academic studies. A particular problem is the imbalance of the research, as the research is dominated by considerations on the supply side, including links between food and culture, agriculture, image destinations and branding, development and marketing (Robinson & Getz, 2014), while incomparably fewer papers are dealing with the topic demand and consumer preferences.

The subject of this paper is rural tourism in Serbia, which is observed in the context of the new channel for marketing agricultural products of rural households. The aim of the work is to use the SWOT methodology to analyze the strengths and weaknesses of rural tourism in the presented context, as well as analyze the opportunities and risks of the environment and point out the advantages and disadvantages of this concept, bearing in mind that the model of integral rural development, in addition to modern agriculture, encourages the development of complementary activities, in this case, the production and sale of agricultural products through rural tourism activities. We believe that the topic is very important and current, considering the socio-demographic situation of rural areas in the Republic of Serbia.

The work is divided into five parts. In the first part, rural tourism was generally presented as a channel of marketing of food products, while in the second part the analysis of the possibility of applying the model of the chain for the value of agro-food products in the function of rural tourism in Serbia was carried out. The third part is devoted to the analysis of general trends in tourism in Serbia. The fourth and key part of the paper presents the results of the SWOT analysis, while suggestions for the guidelines are presented in conclusion to improve the presented concept.

Rural tourism as a food marketing channel

Nowadays, we are witnessing a change in the tourism paradigm, which refers to a radical shift in the values and beliefs of all stakeholders. Viewed from the business side, the financial result is no longer the only measure of success, but attention is increasingly focused on the sustainability principle while preserving the existing values. In this process, keywords are ecology, equilibrium, health, holistic approach. From the perspective of tourists, trips are increasingly aimed at authentic and unique experiences, while approaching the local style of life, unlike in the past when sightseeing, leisure and entertainment were the basis of a tourist offer (i.e. sightseeing, sun and beach). These changes lead to the insight that mass tourism is no longer the "best practice", which leads to service providers turning increasingly towards the individual, flexible and tailor-made tourism (TII, 2012).

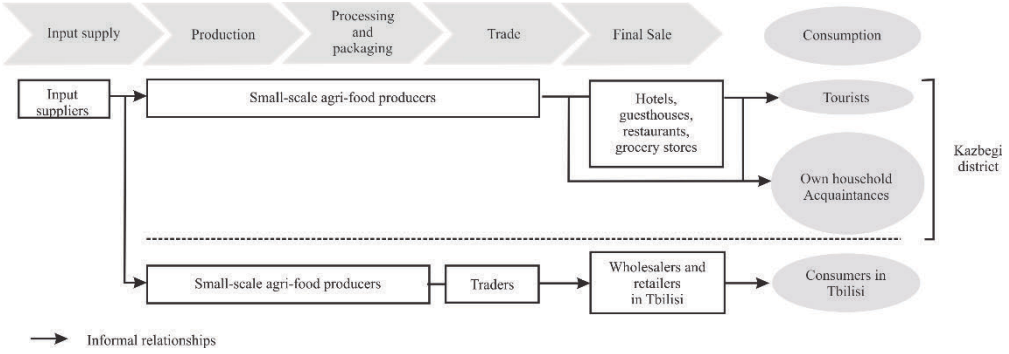
Rural tourism is largely aligned with the new needs of tourists because through this form of tourism they are given the opportunity to experience natural beauty in the authentic accommodation of a particular region. On the other hand, according to Ružić & Demonja (2017), rural tourism brings a number of local economic benefits, of which the most important is the growth of total income, employment, entrepreneurial activity and investments, as well as the stimulation of general economic growth and development, as well as the increase in living standards of local population. The development of rural tourism is also seen as a way of raising the economic resilience of rural areas (Akin, Shaw & Spartz, 2015). In addition to these benefits, the development of rural tourism opens another channel of marketing of agro-food products. In this way, new business initiatives are being launched and mutually beneficial about existing agricultural production and tourism. In this way, agricultural products and traditional handicrafts are developed (product development, commercialization), unemployment is reduced, resulting in the revival of the extinct villages. Young people get new employment opportunities, which in the long run can result in stopping the trend of depopulation in the villages, as well as the activation of women, which today are in the vulnerable category of population, especially in the rural areas of central and southern Serbia. One of the central goals of rural tourism development is the mobilization of the agricultural sector in the development of agricultural products that can be offered in the rural tourism sector to the end consumer or other users in the value chain.

Henderson (2009) points out that the assortment of food has become an important tourist attraction and occupies one of the central places in the tourist experience. In many cases, it has taken on a prominent role in decision making and the satisfaction of tourists, tourism products and promotion strategies. Many destinations promote themselves as food centres and emphasize food products and experiences as an attraction for tourists. Special attention is paid to understanding the "specific requirements of different tourist markets". For example, Smith and Xiao (2008) developed a range of competitive advantages of foodstuffs (wines) and explained the visitors' experience, while (Sparks et al., 2005) found that food and wine are very important for the experience that tourists acquire.

By developing rural tourism, local farmers are given the opportunity to sell their agricultural products to enterprises engaged in rural accommodation or catering, further developing the supply chain. For some tourists, especially from foreign countries, it would also be interesting to participate in the production of food or to cook traditional dishes. (Hüller et al., 2017).

Huller et al. (2017), based on the empirical research carried out in Kazbegi district (Georgia, US), and the Springer-Haize model (2007) offered a customized agri-food chain model in rural tourism.

Figure 1. The agri-food chain model



Source: Huller et al. (2017)

The chart includes the stages and participants in the value chain, from input suppliers, through small-scale agri-food producers, to distributors and users (hotels, guesthouses, restaurants, wholesalers and tourists through direct consumption). The main advantage of this model is that it highlights the fact that the number of intermediaries located between the food producers and the end intermediary is very small, and in some cases intermediaries are not involved (when the farmer organizes food sales in his household, within his tourist offer). Another important feature of this supply chain model is that a tourist, a guest at the farm's farmhouse, is fully informed of the origin of the product, which enables direct quality confirmation.

The presented model can be very useful from the potential analysis for the development of agro-food activities of small agricultural households in conjunction with the development of rural tourism.

Analysis of the application of the chain value model of agro-food products in the function of rural tourism in Serbia

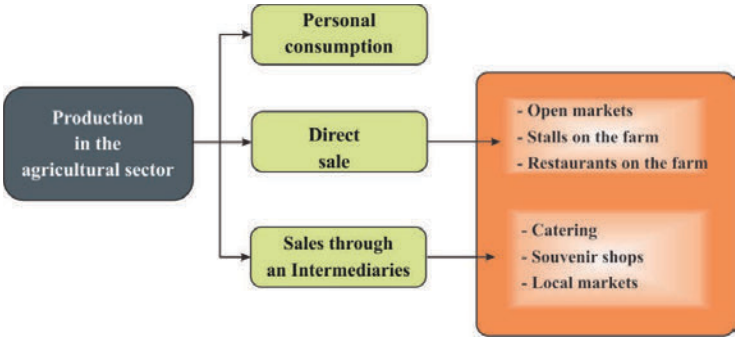
Serbia, for a long period, is undergoing a series of structural changes that are oriented towards the development of market institutions, and it faces some issues. One of the areas in which an optimal solution is to be found is the tendency for rural areas to adapt to the needs of tourism (Trukhachev, 2015). Rural tourism gives priority to rural activities and rural accommodation, and can play a key role in Serbia in terms of diversifying

the rural economy, thus creating opportunities for job creation, which will generate additional income for rural households, reduce unemployment (especially among women population and young people) and will help maintain and re-settle villages. The significance of this activity is also reflected in the priority of the development of rural tourism that Serbia has given within the National Sustainable Development Strategy for the period 2008 - 2017, and that raising the quality of accommodation and reservations in this area is one of the main leverage models presented in Strategy for tourism development of the Republic of Serbia for the period from 2016 to 2025. The reason for this is

The assessment of the high potential of this activity in the process of sustainable development of the rural area in our country. In the upcoming period, it is possible to improve rural tourism if the road infrastructure is improved in rural areas. International standards and quality assurances in accommodation facilities should be introduced. What is most important is to develop awareness of human resources and the need for their development to understand and take advantage of the opportunities offered by rural tourism in a sustainable way. Serbia has the opportunity to develop rural tourism, although it faces a lack of accommodation capacities and impoverished motivation of the local population to be involved in the development process. Social networks and new internet channels of sales, as one of the means to promote rural tourism, will significantly contribute to this process. (Bićanin, 2018)

Relying on the model (Huller et al., 2017), we believe that cooperation with local farmers, locals and the tourism sector is possible to develop a partnership. Serbian villages have small and diverse agricultural production, which needs to be harmonized to participate in the tourism sector. Also, rural households are fragmented and there is a large number of small holdings that are separate from the tourism sector. The development of a partnership between farmers, rural households and the tourism sector is an important goal for the differentiation of the rural economy.

Figure 2. Marketing channel of agro-food products



Source: Modified according to Master Plan for Sustainable Rural Tourism of Serbia (2011), p. 104.

Direct product placement in this model is defined as a process in which agricultural producers directly sell agricultural products to the end user. The process can be carried out through accommodation facilities at the farm, market, stalls at the farm or restaurants on the farm. Indirect placement is defined as the sale of agricultural products to tourism service providers (catering, souvenir shops / national crafts, shops in developed centres for activities) and suppliers of agricultural products (catering, butchers, pilates and self-service).

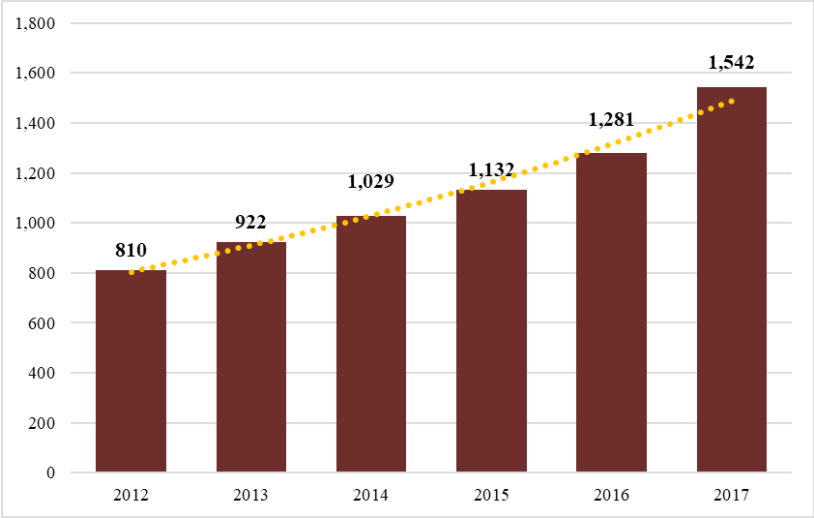
Direct food suppliers in the marketing channel should be agricultural producers. Rural tourism emphasizes certain jobs that were traditionally performed in households from shadows: cooking, cleaning, handicrafts, etc. Activation and formalization of these activities can result in women having a key role in the development of rural tourism. Commercial skills would be developed by promoting women who produce food and handicrafts. "From marketing, tourism is in the process of maturity characterized by saturation with existing methods of meeting needs", concluded Cvijanović, Mihailović and Vukotić (2016), which opened the space for new models.

The model in question is already beginning to develop in some regions in Serbia. There are more and more agricultural farms whose members are contemplating how to sell food they produce through the development of rural tourism instead to slaughterhouses and dairy. Bojčin Forest, a protected natural good, is an example of public-private partnership. Namely, Bojčin Logs run the municipality, and the ethnic-complex, where the cabin guests are feeding, a private owner. The private owner realized that there is a big benefit for him, which is an agricultural producer if he places his products within the tourist offer. In this way, he sells meat and milk products to tourists at the best possible price. Also, the increased tourist demand has prompted the offer, and other households also offer their products.

Serbian tourism development – a brief analysis of the environment

The last years of the 20th century and the beginning of the 21st century have shown that tourism, as a world economy, has achieved primacy over all other branches of economy in all important indicators. Data from the World Tourism Organization (WTO, 2017) for 2002 show that 714.6 million tourist arrivals were recorded in international tourist traffic, which is 3.1% more than in 2001. During 2001, revenues from international tourism amounted to 463.6 billion USD, or 2.8% less than in 2000. According to the WTO forecast, tourist flows will reach 1 billion in 2010 and 1.56 billion by 2020. (Popescu, 2008). According to the WEF (2017) data in 2016, "travel & tourism and its enabling system have proven to be significant drivers of economic growth, contributing more than 10% to global GDP and accounting for 1 in 10 jobs on the planet." Also, travel to rural destinations is in trend. Bearing in mind that the development of this activity represents a general framework for the development of the rural tourism segment, it is important to carry out a brief analysis of the tourism development of tourism in Serbia, and we believe that the relevant period is from 2012.

Figure 3. Tourists arrivals in Serbia, 2012-2017 (in thousands)

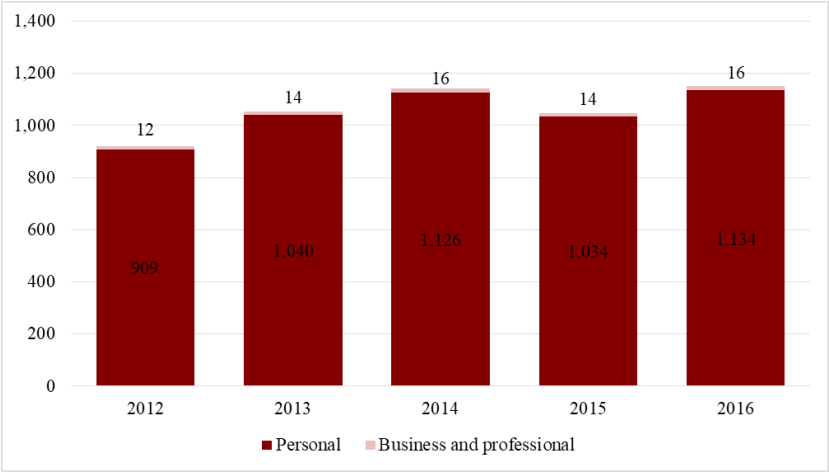


Source: World Tourism Organization (2017), Compendium of Tourism Statistics dataset [Electronic], UNWTO;
Statistical Office of Serbia database for 2017.

The number of tourists is growing significantly, by the rate of 13.74% (CAGR), from 810 thousand in 2012 to 1,542 thousand in 2017. According to the same source arrivals in hotels and similar establishment rise from 2,932 thousand in 2011 to 4,131 thousand in 2015 with an increase in 2012 and a decrease in 2013. The expectations are that arrivals will continue to growth. In 2016 foreign arrival in Serbia account for 46.5% of total arrivals, and show a trend of double-digit growth of 12% on average annually from 2012. In the same period, domestic arrivals grew by 3.7%. During this period, total arrivals in hotels and similar establishment rose from 2,932 thousand in 2011 to 4,131 thousand in 2015 with an increase in 2012 and a decrease in 2013. The expectations are that arrivals will continue to growth. Dynamic restructuring of destinations in Serbia toward a modern, experience-oriented product will drive the demand even further.

Total tourism expenditures in Serbia reached 1,461 million in 2016. The travel expenditures make the most of expenditures (79%), while the passenger transport contributes 21%. In the observed period 2012-2016, total spending of tourists constantly growth, with a minor correction in 2015, at a rate of 7.8% (CAGR). The share of personal spending is dominant in 2016 (98%), while the share of business and professional spending is minor (2%). The share of personal spending is dominant in 2016 (98%), while the share of business and professional spending is minor (2%).

Figure 4. Tourist expenditure by the main purpose of the trip, 2012-2016 (USD mn)



Source: World Tourism Organization (2017), Compendium of Tourism Statistics dataset [Electronic], UNWTO.

Based on the presented data we can conclude that the overall development of tourism in Serbia represents a favourable environment and an incentive for the development of rural tourism. In highly developed countries, about 25% of tourist flows are directed towards rural destinations, while the worldwide interest is less and accounts for around 10%. In Europe, there are about 200,000 registered households, and it is estimated that about half a million people are directly or indirectly employed in rural tourism with around 2,000,000 beds. Annual tourism spending in rural tourism in Europe is around 26 billion euros, and the number of directly and indirectly employed is estimated at around 500,000. As far as the surrounding countries are concerned, rural tourism is the most developed in Slovenia, and most of our hosts go to study visits to households in this former Yugoslav Republic ("Encouraging rural tourism for sustainable local economic development", 2014). It is also important to have in mind that today problems such as the low standard of living, unemployment and underdeveloped infrastructure, are essential characteristics of both urban and rural areas in the Republic of Serbia (Mandaric, et al., 2017) and that development of tourism can change the circumstances.

Despite the modest statistics for this area, Vujko et al. (2016) state that in Serbia about 1,000 rural households with 8,000 beds are providing tourist services, of which only 300 households report this activity as primary. In the future it is expected that the offer will increase, and considering that there is no record and publicly available data on the number of tourists and overnights for a specific tourist product, the trend can be indirectly analyzed based on the global movement of tourist offer and demand in Serbia, in the last 10 years.

SWOT Analysis of rural tourism as a marketing channel for food products

The SWOT analysis method is very effective for evaluating and deciding in various situations in which the system is, regardless of its type and complexity. Identifying the strengths and weaknesses of rural tourism in the context of the marketing channel for food products, as well as the analysis of opportunities and environmental hazards, allows us to see the advantages and disadvantages of the proposed concept.

Table 1. SWOT matrix

Strengths	Weaknesses
• Tradition in the production of agro-food products • High productivity in the production of agricultural products • Products that are recognizable on the domestic and international markets (brandy, ajvar, wines, cheese and cream, fresh fruits and vegetables of high quality, sweet and jams etc.) and authentic handicrafts • The tradition and culture of the "Serbian host" and the imperative that the guest be satisfied • The trend of tourism development in Serbia and the trend of rural tourism development in Serbia (an increase of arrivals, an increase in tourist expenditure) from 2012 to date	• Lack of brands for agricultural products • Lack of supply chain • Insufficient knowledge of the local population on tourism activity • Poor road infrastructure in rural areas • Lack of active and passive vacation content for different target groups • Small diversification of tourist products • Insufficient promotion of rural tourism and food products • Lack of cooperation between agricultural producers • Lack of standards in food production
Opportunities	**Threats**
• Global development of rural tourism in the world and the growth of tourists' interest in these tourist products • Changing the tourism paradigm • In 2007, rural tourism was already defined as a product for the future development of tourism in Serbia in the Strategic Plan for Tourism Development of Serbia (2007). • Defining rural tourism as one of the leverage in the growth model in the Tourism Development Strategy of Serbia in the period from 2016 to 2025. • Serbia is currently primarily positioned as a natural and cultural destination. • Poverty Reduction Initiatives • A relatively simple and inexpensive channel for promoting rural tourism through online services, such as Booking.com or Facebook. • The possibility of expanding the market through the organization of tourist trips and sales of souvenirs - agricultural products	• Competition - rural tourism offer in countries with similar natural and cultural resources (region of the former SFRY) • High input costs of agricultural production • Land fragmentation and spatial dispersion of agricultural producers • Poor structure of sources of funds and the lack of favourable credit loans, as well as the possible increase in the interest rate • Turbulent political situation

Source: authors

Conclusions

The conclusion based on the SWOT matrix is that the Republic of Serbia has great potential for the development of rural tourism, which is a trend in the countries of the European Union. The interest of tourists for non-standard tourism products is at the forefront of the development of world tourism. One of the highest priorities is the synthesis of agriculture and tourism, which would be the basis for the development of diversification in rural communities. The exceptionally favourable conditions for the development of tourism in the countryside of Serbia are characterized by preserved nature, mild climate, clean air, rich flora and fauna, unpolluted rivers and lakes, a tradition in production.

Insufficient coordination of rural tourism entities has formed an undifferentiated offer. To ensure this, it is essential that tourism service providers cooperate, and also with other entities that plan and direct this development at the macro level. This would have positive effects in the short and long term. Local tourism organizations have improved the development of rural tourism through better marketing at the national level in recent years. Improving the tourist offer in the short term is made up of local and regional events.

Serbia is still in the initial stage of development despite its advantages. Regardless of natural, social and cultural good predispositions, Serbia did not turn its comparative advantage into a competitive one. Activities to improve the tourist offer include: developing and strengthening the supply of rural sector, operational marketing plan, market information system and adjusting manifestations to children. In addition to these, challenges should be overcome by introducing international standards, improving local infrastructure, reducing lapses in the value chain, setting up a rural tourism system for environmental protection that will contribute to raising awareness of environmental protection in the local population and introducing brands for agricultural products. The development and advancement of the rural environment represent a sustainable and stable regional economic development.

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Conflict of interests

The authors declare no conflict of interest.

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PRICE STABILITY OF AGRICULTURAL PRODUCTS IN THE EUROPEAN UNION

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ABSTRACT

Agricultural sector in the EU functions under strong influence of the CAP. EU finances the measures to support production of agricultural products and food. CAP is founded on the goals of ensuring price stability. Correlation and regression analysis have largely confirmed the given hypotheses. General price levels in EU, as well as the prices of agricultural products have been stable, as shown by the respective trend line equations. Correlation and regression analysis of support for agricultural production and prices of agricultural products indicate a moderate correlation level, i.e. the support contributes to price stability. Correlation analysis confirms the influence of prices of industrial products on the prices of agricultural products. Results of price movement analysis of agricultural products and foods on one hand, and independent variables affecting prices on the other, show that CAP objectives have been mainly accomplished. Thus, interventionism in agriculture brings economic effects and justifies the CAP measures.

Introduction

Measures of the Common Agricultural Policy (CAP) of the European Union (EU) financially support the production of agricultural products and food. The objectives of the CAP have been defined back in the Treaty of Rome. CAP has created a modern and productive market for agricultural products and food, built on the tradition and high standards of production, processing and transport. Namely, in the creation of CAP instruments, little concern was paid to the level of protectionism and possible distortion in the trade with the rest of the world (McMhanon, 2007). After all, the primary reason for the concern for agriculture was strategic: to ensure own food production. The

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second reason is the assumption that if a country is able to meet basic food needs (as is the case with developed market economies), the price elasticity of demand (Edp) for food would be less than 1 (Jovanović, 2013). Such inelasticity affects the price decline (p) of agrarian products and foods as the supply / quantity (q) of supply increases as per following formula:

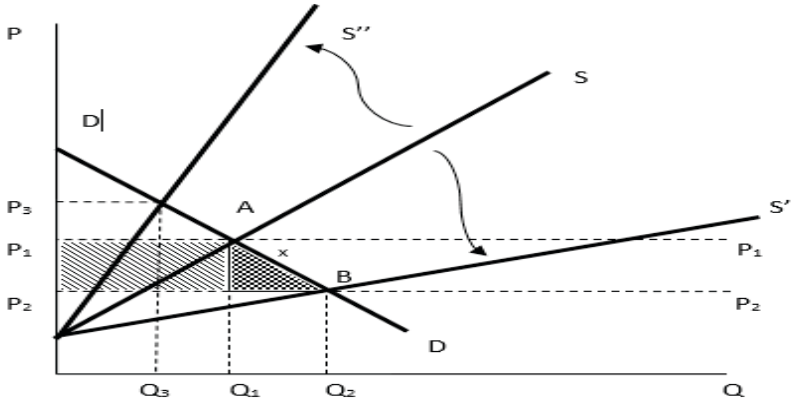
$$E_{dp} = \frac{\Delta q/q}{\Delta p/p} = \frac{\Delta qp}{\Delta pq} =< 1$$

Ultimately, the relative price of food in developed economies decreases due to low price elasticity, but also due to demand elasticity (Y) which is less than 1, that is:

$$E_{dp} = \frac{\Delta q/q}{\Delta y/y} = \frac{\Delta qp}{\Delta pq} =< 1$$

Naturally, agricultural production is affected by natural conditions. Today, the CAP is an environmentally responsible and socially responsible policy, expected to deliver an effective production system competitive in the world market (Quiroga, Suarez, Fernandez Haddad, Philippidis, 2017). The CAP is being modernised through reforms, from MacSharry to the present day. Therefore, the old and reformed goals of the CPA can be achieved by stimulating production growth as the supply growth, i.e. higher production level of agricultural products tends to stabilize prices. Secondly, lower prices may lead to the growth of real demand for agricultural products (Popović, 2016), as shown in the following chart.

Figure 1. The impact of agricultural policy on supply and demand

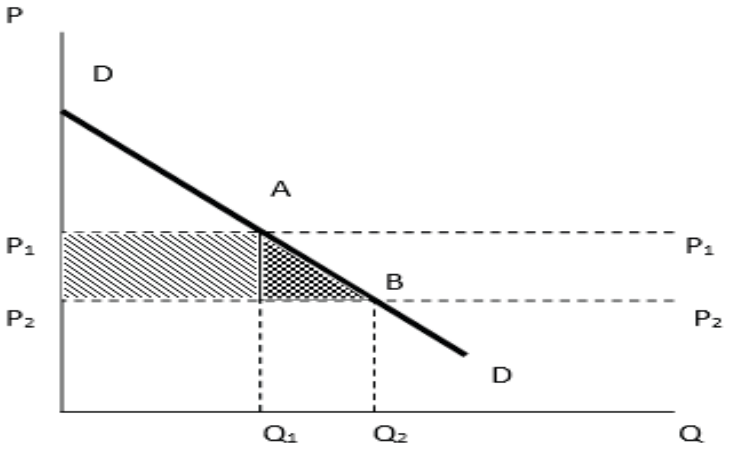


Source: Representation by the authors

The above graph shows that the growth of supply from S to S' leads to price drop from P1 to P2. Therefore, in the case of constant demand, consumers may buy more products for the same amount (Q2). Analogously, the drop in the S' supply increases the prices to P3 level. The consumer surplus is shown by the P1P2BA area. This is a simple analysis as it does not include additional constraints.

Interventions of CAP and their impact on prices. Agricultural support is an instrument for accomplishing the general objectives of agricultural policy (Hansen, 2015). Price policy in agriculture is either directly or indirectly implemented by the CAP measures. The prices strongly affect the agriculture of EU (Walls, Cornelsen, Lock, Smith). However, in the early stages of the EC, there were problems, such as, hyper-production of butter production due to high intervention prices. Fast and profound CAP reforms, alongside with the respective pricing policy, included control of imports and other measures (Riccardi, F., 2001). The events that caused disturbances in the market have been supplemented and redefined over time (Bureau, Swinnen, 2018). Import and export of agricultural products and foods affect price stability. If there is a price increase in the EU market, there will be increase in imports at lower global prices. If the world prices rise above the standard prices, exports will increase (Ostashko, 2016). Reforms reduce the disproportion between supply and demand in the agricultural product market (Kotulic, Dubravska, 2015), whereas their sufficient quantities provide stable prices. Furthermore, the growth of real income influences real food prices, as can be seen from the hypothesis of Prebisch-Singer and Engel's law (Baffes, Haniotis, 2016). Finally, consumer prices in the EU Member States indicate differences in the structure and efficiency of their food markets (García-Germán, Bardaji, Garrido). The following graph shows the theoretical aspects of CAP interventions and price policy.

Figure 2. Interventions and prices of agricultural products



Source: Representation by the authors

The result of the intervention is the price drop from point A to point B. The intervention creates consumer surplus P1P2BA. Under the assumption of the same purchasing power, the consumers may purchase more goods for the same amount (Q1 moves to Q2). There is a strong link between the CAP intervention and the price of agricultural products and food in the EU. Deviations created as a result of interventions are resolved through new CAP measures.

The statistical analysis shall include a correlation and regression analysis model, whereby each value of a phenomenon corresponds exactly to a specific value of the second phenomenon. Statistical or stochastic relations (links) are weaker in comparison to the functional ones. Regression analysis consists in the application of methods which utilise analytical (by means of equation) explanation of the statistical link between the observed phenomena. The regression analysis assessed the cause-effect nature of the relationship (independent and dependent variables). The analysis is based on the regression model. The equation with parameters and variables explain the connection of the observed phenomena, predicting the values of the dependent variable for certain values of the independent variable. There are two models, which are a simple regression model and a multiple regression model. The simple linear regression model analytically displays the relationship between two phenomena (dependent and independent variable). The model feature is that the change of a phenomenon is followed by the approximately same linear change of the second phenomenon.

The equation of the first regression direction: $Yc = a + b \cdot x$

$$b = \frac{\Sigma XY - \bar{X}\Sigma X}{\Sigma X^2 - \bar{X}\,\Sigma X} \qquad a = \bar{Y} - b \cdot \bar{X} \qquad \bar{X} = \frac{\Sigma X_i}{N} \qquad \bar{Y} = \frac{\Sigma Y_i}{N}$$

Calculation of parameters:

The linear correlation coefficient (Pearson correlation coefficient) is a numerical measure of the strength and direction of the interconnection between the two phenomena that are placed in a linear statistical correlation. The coefficient formula is:

$$r = \frac{\Sigma(X_i - \bar{X}) \cdot (Y_i - \bar{Y})}{\sqrt{\Sigma(X_i - \bar{X})^2 \cdot \Sigma(Y_i - \bar{Y})^2}}$$ Spearman's rank correlation coefficient:

$$r = 1 - \frac{6 \cdot \sum_{i=1}^{n} d_i^2}{n^3 - n}$$ where by $di = r_x - r_y$

Materials and methods

The institutions of the European Union are committed to preserving the price stability. The European Central Bank (ECB) is in charge of price stability in the European Union and the Eurozone. According to Article 105 of the Maastricht Treaty, the main task of the ECB is to maintain price stability, stating that "without prejudice to the ECB's price stability, the ECB will support the general economic policy of the Community" (Jovanović, 2016). The monetary policy of the ESCB is also aimed at maintaining price stability, as set out in Article 127 of the Treaty on the Functioning of the European Union (ECB, 2017). With low inflation being their primary goal, the ECB has other tasks[4] to define and apply

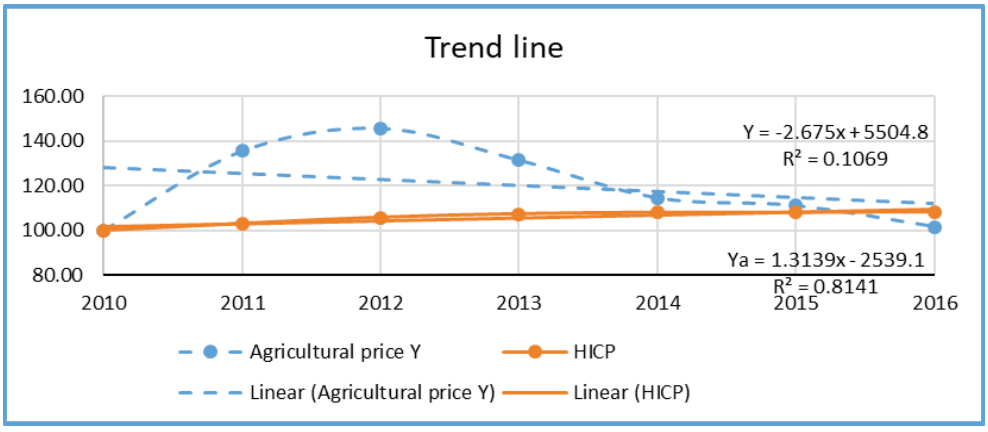
4 Target price stability level (inflation rate) was 2% in 2015, 2016 and 2017. That was the period ECB fought against deflation.

monetary policy, to maintain and manage the payment system and foreign exchange reserves of member states, as well as to conduct foreign exchange operations. There are several reasons for maintaining price stability, but the priority is a stable euro.

Price stability is included in several common policies of the EU. The production of agricultural products at "acceptable", i.e. "reasonable" prices is part of the Treaty of Rome. For example, Articles 32-38 of the EC Treaty regulate the legal foundations of agricultural policy (Popović, 2016). Article 33 defines five objectives of the CAP. One of the given objectives is "the supply of agricultural products and food at the so-called reasonable prices" (Popović, 2016). Thus, the first objectives of the CAP are clearly determined by the price policy and consumer interest. Since then to the point of revised objectives, the "acceptable" or "reasonable" prices persist, and are one of the conditions for the existence of the CAP. Revised and updated objectives, alongside with the old ones, contain new relevant information related to sustainable development, diversification, changes in the payment system, strengthening the regional approach with emphasis on rural development, competitiveness increase, etc. Practice has shown that price stability in the production of agricultural products and foods is maintained as the founding goal of the CAP.

The success of monetary and agricultural policy in the European Union reflects the movement of the general price level and prices of agricultural products (Chart 1).

Figure 3. Trends for the general level of inflation in the EU and prices of agricultural products



Source: Representation by the authors

In the period observed, the EU faced deflation announcements. The general price level is low but maintains constant growth. Only at the beginning of 2017, targeted inflation of 2% is achieved. During this period, notably high oscillations in the prices of agricultural products were observed (record level was achieved in 2012). The trend in the price of agricultural products is favourable as per the trend line (in 2016 the price index is lower than the general price level). The table suggests that price stability is favourable, at least when referring to the period observed.

CAP Support and price stability in agriculture: correlation and regression analysis

The attitude towards prices in agriculture bears a particular social significance. Although this area contributes little to GDP, its importance is higher in terms of consumption and real wages, as well as complementarity with other industries. CAP creators insist on price stability, which is why it is not surprising that the issue of price support is unavoidable in almost any of the CAP reforms. Robert Ackrill pointed out that price support has the biggest impact on the EU budget. He even takes an extra mile and proves that price support is probably more useful than export support.

The question asked is: how much do allocations for CAP contribute to price stability? That is, whether the prices of these products are increasing faster than the general price level or even faster than some other industries? Hypothetically, the support affects the stability of prices of agricultural products and food. One of the methods is to compare the allocations in this area, as well as to compare the prices of agricultural products and food. Secondly, the correlation and regression analysis shows to which extent the allocations for CAP, as an independent variable, affect the prices of agricultural products as a dependent variable. The following table has been prepared in that respect.

Table 1. Total allocations for agriculture and prices of agricultural products (2008-2014)

EU / Year	2007	2008	2009	2010	2011	2012	2013	2014
Total allocation for CAP (billion EUR)	51 643	56 827	57 186	58 643	58 389	59 347	58 852	57 994
Total allocation for CAP (2010=100)	88,06	96,90	97,51	100	99,57	101,2	100.36	98,89
Total price of agricultural production (2010=100)	-	96,9	99,4	100	110,6	117,3	120,4	112,4

Source: Representation by the authors based on Eurostat[5]

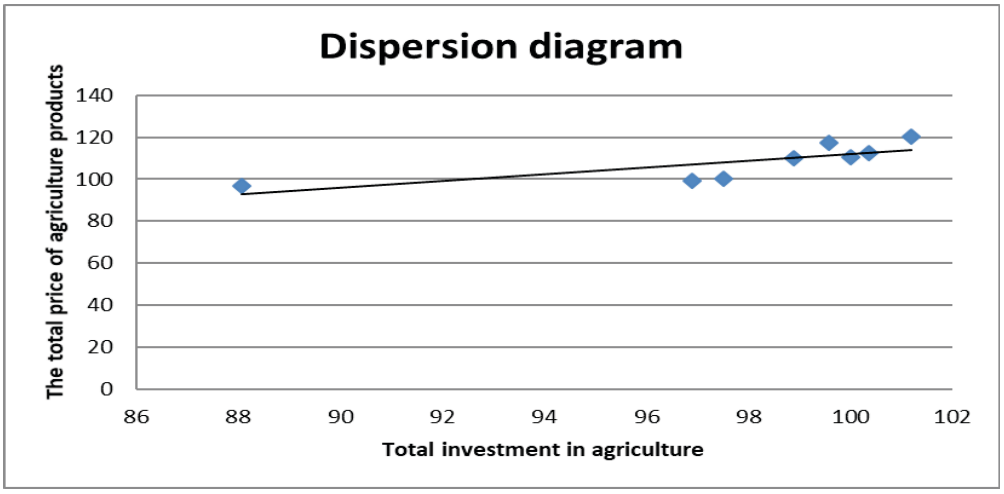
The data from the table show that since year 2008, the support to agricultural production has been stagnating and has ranged from 57 to 59 billion euros a year (in 2007 it amounted to 51.6 billion euros). Thus, the outbreak of the crisis (USA, 2008) and its "overflow" to the EU (2009) did not jeopardize the allocation for the CAP. On the contrary, in year 2008, funds for the CAP were increased by about 10% to approx. 57 billion euros. However, there were attempts to reduce the CAP budget. For the period 2014-2020, the United Kingdom proposed a reduction of 50%, which would be a reduction of about 200 billion euros for the CAP over the seven-year period (Agrafacts, 2012). If such proposal had passed, it would affect the prices of agricultural products and food in the EU.

5 Eurostat is missing data for certain years

From 2008 to 2013, prices of agricultural products were rising rapidly. The escalation of the global crisis was preceded by a global increase in the price of agricultural products and food in 2006/2007, which was transferred into the EU by the "spillover" effect. Calming of agricultural products' and food prices started only in 2014.

Regression analysis: the regression function indicates a positive link between the observed variables (y = 4,61x-349,33). Thus, the movement of the variables is consistent with the results of the correlation and regression analysis as there is a medium strong correlation between the observed variables. Pearson correlation coefficient is r = 0,761056, which indicates that CAP allocations follow price movements to some extent, thus affecting price stability[6]. Other results of correlation and regression analysis: standard error of linear regression is = 6,662219071 whereas Spearman's rank correlation coefficient is 0,821429. The conformity of the interconnection between the variables is also shown by the dispersion diagram.

Figure 4. Dispersion diagram for agriculture and the prices of agricultural products



Source: Authors' calculations based on Table 1.

Shift analysis. For the purpose of a more realistic analysis, the data on the prices of agricultural products are shifted 1 year in advance. Due to the length of the production and sales process, the prices of these products are recorded only after a certain period (assumption: shift is 1 year). Therefore, the allocations for agriculture in year *n* result in price effects in *n+1* year. The analysis is more reliable as the correlation coefficients are higher and the standard error is lower, as can be seen from the results of dispersion diagram:

6 The absolute value of the correlation coefficient determines the strength of the relationship between the observed variables. For $|r| = 1$ there is a total correlation, for $0.8 \leq |r| < 1$ strong correlation, for $0.5 \leq |r| < 0.8$ moderate correlation, for $0.2 \leq |r| < 0,5$ relatively weak correlation, weak correlation, $0 < |r| < 0.2$ very weak (insignificant) correlation, and finally for $|r| = 1$ there is a complete absence of correlation.

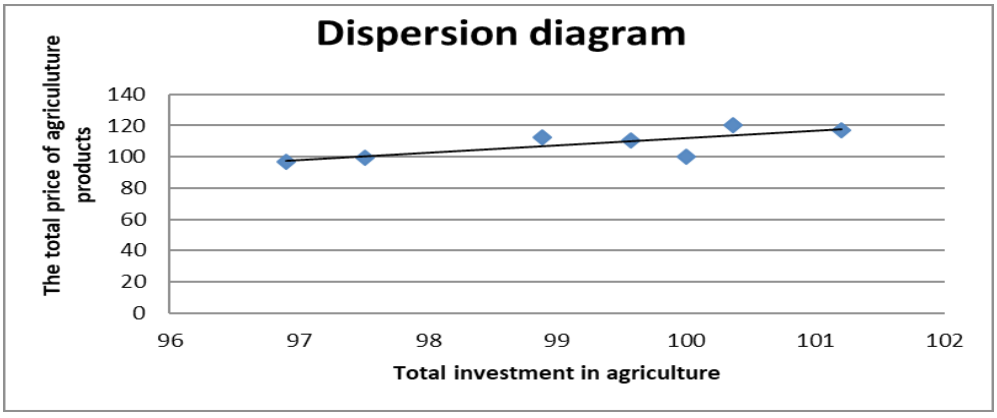
Table 2. Results of correlation and regression analysis

Correlation	0,766551056
Pearson Correlation Coefficient	0,766551
Spearman rank Correlation	0,928571
Standard error of linear regression	6,034473794
Regression function	y=1,59x-47,24
N	8

Source: Representation by the authors

Comparison of the results of the analyses both with the shift and without the shift shows that the latter version shows a higher level of correlation between allocations for the CAP and the movement of prices of agricultural products. For Pearson correlation coefficient it is slightly higher and amounts to r = 0,766551, whereas Spearman rank correlation coefficient shows a significantly higher level of variation of the variables. Other results of correlation and regression analysis: the standard error of linear regression is lower than in the former (first) version and is = 6,034473794 while the regression function shows a positive relationship between the variables, or y = 1,59x – 47,24.

Figure 5. Dispersion diagram for agriculture allocations and prices of agricultural products



Source: Authors' calculations based on version 2.

Results and discussions

The analysis shows price relationships in the sectors of industry and agriculture. The hypothesis is that the prices of industrial products have an impact on the *input*s of agriculture. The European Union has a developed chemical industry, machinery and vehicle industry, as well as a stable energy sector. With budget incentives, these are the key preconditions for the development of productive and modern agriculture. The strong influence of the industrial products' prices on the agricultural sector is reflected in the prices of agricultural products, even in the light of the support that EU agriculture receives from the CAP. Table no.3 was prepared in order to determine the link between the prices of industrial and agricultural products.

Table 3. Total industrial prices and prices of agricultural products (2010=100)

EU / year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Industrial prices	100,5	96,8	100,0	105,6	108,3	108,2	106,2	103,7	102,0	105,3
Agricultural products' prices	96,9	99,4	100,0	110,6	117,3	120,4	112,4	109,8	108,7	-

Source: Representation by the authors based on Eurostat

The insight into the table and the comparison of data indicate a faster rise in the prices of agricultural products in relation to the price growth of industrial products. This is particularly noticeable since 2010, when every year prices in agriculture record a cumulatively faster growth. There are many reasons for such occurence. The primary one being that the prices of agricultural products are mainly affected by external effects and the general rise in world food prices. This means that the price level and their stability are affected neither by the ratio of aggregate supply and demand for agricultural products, nor the CAP measures, which also indicates an uneven cumulative price index of agricultural products.

Regardless of the faster price increase of agricultural products in relation to the industry, the correlation analysis shows a high level of interdependence on price developments in industry and agriculture. Therefore, the conclusion is that prices of industrial products in the European Union determine prices in agriculture, which is evident from the results of the regression analysis.

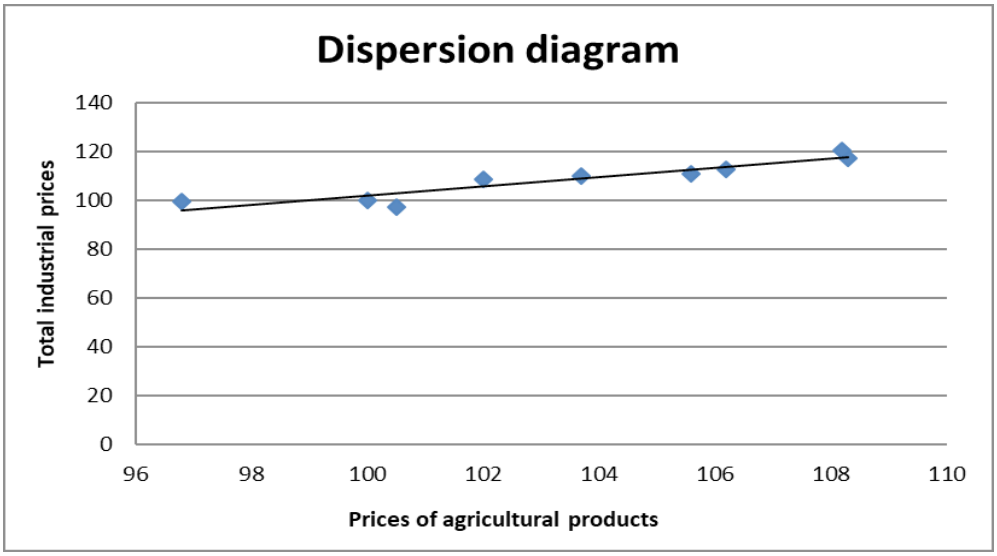
Table 4. Results of correlation and regression analysis

Correlation	0,926003619
Pearson Correlation Coefficient	0,926003619
Spearman rank Correlation	0,933333
Standard error of linear regression	3,284621799
Regression function	y= 1,90x-88,70
N	10

Source: Representation by the authors

The regression function provides an insight into a positive relationship between the observed variables (y = 1,90x - 88,70). Movement of the variables is consistent, as can be seen from the results of the correlation and regression analysis. There is a strong correlation between the observed variables as Pearson correlation coefficient is r = 0,926003619, which explains that industrial prices have a dominant effect on the price stability of agricultural products. The other correlation and regression analysis results confirm the high consistency of the relationships between the observed variables: the standard error of linear regression is = 3,284621799 whereas Spearman rank correlation amounts to 0,933333. The relationship between the variables is also shown by the dispersion diagram.

Figure 6. Dispersion diagram of prices of industrial and agricultural products



Source: Authors' calculations based on Table 3.

Production of cereals, milk and meat in the period 2007-2015 is uneven. Cereal production is the highest, while moderate but uneven growth is recorded only in milk production (record production registered in 2010 and 2015). From 2007 to 2015, cereals had the highest and continuous increase in prices. However, by 2014, the highest growth was recorded in milk production, but the prices of milk in 2015 dropped significantly (by 20 index points). The reason is the abolition of production quotas for European milk producers, and transition to free production on 1 April 2015. The production quotas within the CAP had been applied for as many as three decades, and despite the antagonism demonstrated by some partakers, they have yielded good results in the field of production, productivity, competitiveness and milk prices. Therefore, Romuald Schaber, the head of the European Milk Board, said that " The changeover to a free market economy of milk and dairy products is dangerous because, due to surplus in milk, large producers will dictate terms and milk prices will drastically decrease" (Popović, 2016). This estimate has been confirmed through a large increase in production and a further drop in milk prices in 2015.

The production and prices of milk and basic agricultural products are shown in the following table.

Table 5. Production and prices of beef, milk and cereals

Production and prices of beef, milk and cereals (1000t)									
EU / year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Beef	8.258	8.130	7.766	7.565	7.610	7.579	7.271	7.421	7.583
Milk	151.824	153.656	152.677	150.869	149.928	153.042	159.026	164.837	168.145

Production and prices of beef, milk and cereals (1000t)									
Cereals	61.186	59.498	55.451	56.594	58.108	57.956	57.852	57.437	61.186
Prices of beef, milk and cereals									
Beef	111,00	110,2	102,2	100,0	110,6	119,6	122,3	115,8	110,4
Milk	100,6	101,9	101,2	100,0	99,4	101,4	105,4	109,3	111,5
Cereals	102,2	98,9	97,6	100,0	106,6	109,5	114,0	114,7	114,6

Source: Representation by the authors based on Eurostat

The relationship between supply and demand is the basic economic pattern. Accordingly, it is assumed that the growth of agricultural products leads to lower prices, that is, prices drop or remain at about the same level. Because of the CAP measures and EU support, this pattern is questionable, but correlation and regression analysis have confirmed the set hypothesis, particularly on the example of the increase in supply (production) of beef and even milk. This is evident from the results of the correlation and regression analysis comparisons shown in Table 6.

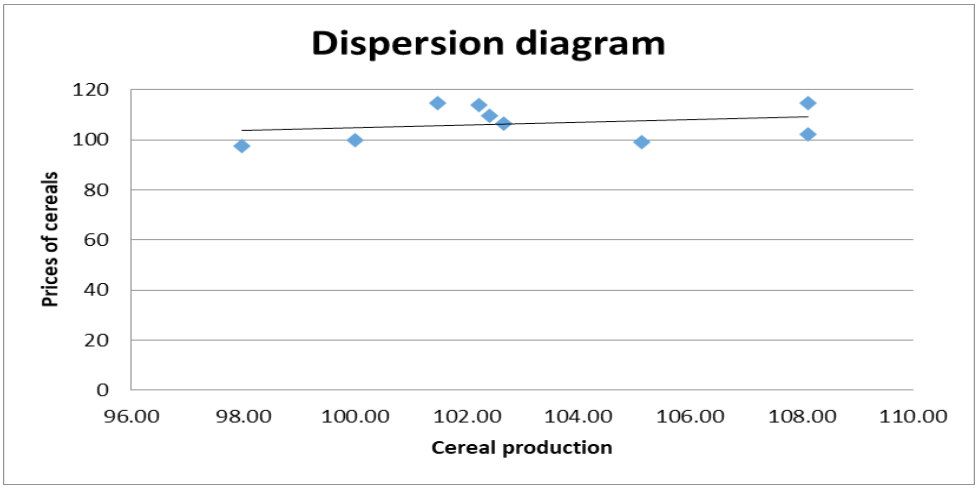
Table 6. Correlation coefficient for meat, milk and cereals

Correlation meat	-0,35072
Correlation milk	0,193994619
Correlation cereals	0,245556505
N	9

Source: Representation by the authors

The correlation measured by Pearson correlation coefficient for beef equals to r = -0,35072. Correlation coefficient for milk is r = 0,193994619, while correlation coefficient for cereals amounts to r = 0,245556505. Therefore, the growth of meat production leads to a price drop. The relatively minor but negative correlation indicates the existence of a certain degree of negative elasticity of prices, that is, the increase in the production of beef affects the decline in the price of that product. Even the minor positive correlation between milk production and milk prices, as well as the relatively poor correlation for cereals, mainly confirms, more than it contests the law of supply and demand. Moreover, moderate production growth is slightly correlated with the prices' movement of milk and cereals. It should be noted that cereals, unlike milk, are absolutely interchangeable goods and that there is a developed world market for these products. This practically means that a drastic drop in production may occur in some countries, with the market prices dropping nevertheless due to the impact of import prices. Finally, the correlation and regression analysis of the production and price of the given agricultural products is a confirmation that the EU through CAP measures affects total production, accomplishing one of the fundamental objectives: ensuring agricultural products for a single market at "reasonable / acceptable" prices. In doing so, the price stability of agricultural products and food is maintained. Indirectly, stability and growth in the production of agricultural products acts as a significant factor in overall price stability.

Figure 7. Dispersion diagram of cereals production and price of cereals



Source: Authors' calculations based on Table 4.

Conclusions

Since 2008 the CAP budget has been from 57 to 59 billion euros per year (in year 2007 it was 51.6 billion). Prices of agricultural products maintained their growth from 2008 to 2013. The global financial crisis (2008/2009) was preceded by the price increase of agricultural products and food throughout the world (2006/2007).

Since 2010, prices of agricultural products and food in the EU have been relatively stabilized. The stable price period has started only since 2014. For the period from 2010 to 2016 the price comparison of agricultural products and the general price level indicated the inequality of the former in relation to the general inflation rate. However, the trend lines point to "price calming in agriculture," whose cumulative index approached the general price level in year 2015, and even dropped below the inflation rate in 2016.

The uneven movement of the price level of agricultural products is the result of multiple factors. The most common ones being: natural conditions for production, impact of world prices and the CAP support.

Correlation and regression analysis show that financial allocations from the CAP as independent variables affect the prices of agricultural products as a dependent variable. It has been proven that there is a positive relationship between the variables, which is evident from the regression equation y = 4,61x-349,33. There is a medium strong correlation between the variables as the Pearson correlation coefficient equals to r = 0.761056.

This is a confirmation that allocations for CAP affect price stability in agriculture. Affirmation of the effect is also the high Spearman rank correlation coefficient of 0,821429.

Prices in agriculture are growing faster than industry prices. Prices of industrial products

affect the prices in agriculture. Correlation analysis indicates a high correlation on price movements in industry and agriculture, as evident from the equation y = 1,90x – 88,70.

There is a strong correlation between the variables. Pearson correlation coefficient amounts to r = 0,926 with Spearman coefficient being 0,933 thus proving that industrial prices are crucial for price stability in the EU agriculture.

CAP Measures and support are focused on the growth of production, i.e. of supply. The correlation and regression analysis of the production of beef, milk and cereals as independent variables and the price of these products as dependent variables confirmed the hypothesis that the growth of production affects the decrease (and maintenance on the same level) of the price of beef and even milk.

Pearson correlation coefficient for beef is r = -0,35072, for milk equals to r = 0,193994619 and for cereals amounts to r = 0,245556505. Therefore, higher meat supply affects a price drop, whereas the growth of milk production, and to a certain extent - of cereals as well, maintains prices at the existing level.

General conclusion: correlation and regression analysis do confirm and evidence the effect of the CAP support on prices and production of agricultural products and food. Such practice enables the achievement of the founding objective of the Rome Treaty: to ensure sufficient quantities of agricultural products and food, but at "reasonable" or "acceptable" prices.

Although this subject is somewhat challenged by the public, it is a fact that CAP measures influence the price stability of agricultural products and food in the European Union.

Conflict of interests

The authors declare no conflict of interest.

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POSSIBILITIES TO PREVENT NEGATIVE ENVIRONMENTAL IMPACTS

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ABSTRACT

This research paper introduces results of research through analyses of a significant number of activities, aimed at preventing the negative impact of tourism in the area of its operating, observed through a selected number of exemplified managing system protections, in particular world's natural sites, including the Republic of Serbia. Important models of protection are presented through numerous case studies, among which, especially observed, and noted in this research paper are: establishing site protection status on an international and local level, zoning of tourism and site carrying capacity. Taken into consideration, these models can give positive results by contributing the planning strategies of other countries or regions, including the Republic of Serbia. With regular monitoring, they are to bring constitution to novel or implement the existing measures of protection, aimed at promoting positive ecological and social long-term outcomes.

Introduction

Tourism development has an impact on creating different positive and negative environmental effects. Tourism brings foreign exchange flow that strengthens economic development and improves national economy. However, tourism also brings all those negative consequences, that can affect sustainable local community growth, unless its development is being taken care of. In this way, the tourism can develop significant consequences, some being devastating for surroundings and the environment it is

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operating in. The cause of this are uncontrolled negative effects on the elements of natural living environment, such as air, water, soil, flora and fauna. Many countries' concern today is constant preventing of the bad influences, as well as the support of good ones. By implementing positive actions and measures, these bad influences can be eliminated or brought to a minimum. Along important measures of protection and possible models for preventing bad influences, this research paper documents the following: adopting and establishing measures and forms of protection, zoning, within which the tourist movements are made, and carrying capacity as a recommended form of maximzied number of site visitors at a certain time interval. Data analysis examples from the worldwide pratice can in many ways serve either the existing or the future models of prevention. The object of the study are different site protection status, zoning and carrying capacities.

Methodology

In this research a method of content analysis for written information will be used. This method objectively describes the content and importance of information, thus eliminating a possibilty of incomplete assessment of the indicated matter. For the purpose of this research, various data sources have been used from the field of tourism and natural environment protection, based on data related to preventing the impacts of tourism on the environment, through selected methods. Quantitative and qualitative content analysis of different data and analyzing will be applied. Accordingly, the base method relates to adopting and passing of legal acts by different subjects in protection procedures, implementing of these regulations, establishing protection zones and site carrying capacity. The collected written data has been analyzed and presented, with final aim at giving conclusions and judgements about the existing models and states for environmental protection in tourism.

Results and discussion

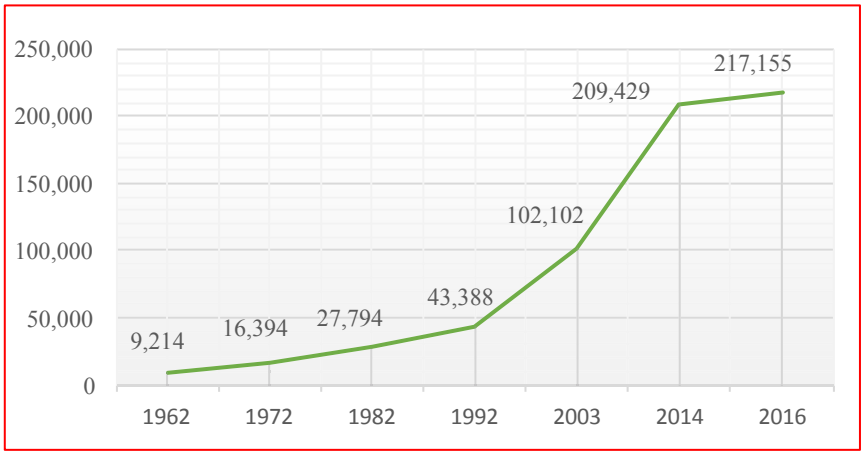
Numerous international analysis results indicate that one half of global tourist movements belong to geotourism, i.e., travelling to certain geographical destinations, mostly attractions within protected natural environment. Globalization of tourism and its spreading has contributed to creating numerous studies and projections which, based on experience, analyze the relationship of tourism towards environmental resources. Tightly connected with these projections is the idea of sustainable tourism, as a way of optimal use of tourist resources, without degradation, along possiblity of being applied by future generations (Stojanović, Stamenković, 2008). Sustainable tourism development in a certain site should explain how to preserve this site and tourist development at the same time, i.e., how to prevent tourist, ecological and sociocultural devastation of the given site (Štetić et al., 2013). Agriculture, as an important economic activity, also takes special place in sustainable development because it is a significant pollutant in nature. On the other hand, it is tightly connected with tourism because it represents the main provider of tourism industry. In the last few decades, especially in developed countries, economic,

ecological and social development are balanced, with multifunctional agriculture taking special place (Delić et al., 2017). In order to explore the site as a 'framework' and offer guidelines for qualitative 'stage' for creating and developing tourism product, we have to consider basic settings and changes in tourist flows on a global level, in order to have an impact on: following changes in diversification of global tourist movements, changes within tourist offer and dramatic price decreases of 'basic tourist product', increased need for visiting preserved natural environment and keeping balance between mass and sustainable tourism (Štetić et al., 2013). This tourism industry has $500 US billion yearly share in global tourism, indicating the preserved resources' value of $250 US, through this type of tourism only. In many African and Latin American countries, almost the entire tourism industry is based on the protection of resources. In Yukon, south of Canada, each invested Canadian dollar in a park brings an increase of $3.50 CAD of income in total (IUCN, 2018).

International Union for the Conservation of Nature (IUCN) describes a protected natural resource as a space that covers protected area of national importance, within which various activities, including tourist ones, are being performed, and it is protected for the reason of preventing exploitation and possible degradation. According to this, the reasons why certain areas or objects are being protected are: their use for the purpose of scientific research, protection of wildlife, preservation of species and genetic diversity, providing services in natural environment, protection of specific natural and cultural forms, tourism and recreation, education, compatible use of resources from natural ecosystems, as well as preserving cultural and traditional characteristics (Mulongoy, Chape, 2004). Modern idea of protected areas dates back from the 19th century with "the novel" Australian, Canadian, New Zealand, South African and USA nation of the time, by declaring Yellowstone as world's first national park, on 1st March 1872, after which during the 20th century the idea had been spread around the world. The outcome was a significant increase in number of protected areas. Almost every country established laws on protected areas and formed locations for this matter. Abisko was founded in 1909 as the first national park in Europe (Sweden), followed by Engadin in Switzerland, in 1914 (Delić et al., 2017; Vasović, Jovičić, 1984). The oldest known measure of protection for preserving nature was brought in London, in 1273, and it was related to limiting the impact of ash and smoke. In Poland, in 1499, Moose (*Alces alces*) and Tarpan (*Equus caballus gmelini*) conservation laws were established, and nature conservation and forestry laws were established in 1597 and in 1769. These laws put certain animal and plant species under their protection. In Middle Ages, first sanctuaries for sacred wildlife in China appeared. In Russia in 1703, some forest complexes with rare tree species were conserved (Vidaković, 1989). Humanity's interest for protection of sites and their visiting throughout the history is best described in the following data: by 2002, about 44,000 locations satisfied the IUCN definition of a protected area, which covered almost 10% of planet's surface (Eagles-Paul et al., 2002). It is clear that globally protected resources have increased dramatically since the United Nations' first protected properties were released in 1962, with 9,214 protected

areas on a 2.4 million km^2 surface. The number increased from 16,394 in 1972 to 27,794 in 1982. By 1992, there were 43,388 resources, while in the reports from 2003, 102,102 protected locations were displayed, covering an area of 18.8 million km^2. This number was equivalent to 12.65% of land surface, or area which is larger than common surface of China, South and Southeast Asia. Out of this whole protected area, it was estimated that 17.1 million km^2 constituted a land surface, which was 11.5% of the total area in the country. According to the same data source, marine protected areas took up approximately 1.64 km^2 of surface in 2003, and the estimated amount was 0.5 % of the world's sea and less than one tenth of the total surface of protected areas around the world (Hall, Frost, 2009). According to the UN data for the year 2014, there were 209,429 protected areas in a world with a total surface of 32,868,673 km^2 – which makes the space larger than the African continent. In total, 3.41% of the world's marine area and 14% of the world's terrestrial areas are currently protected. If Antarctica is excluded from the global statistics coverage, the percentage of the total terrestrial area protected is 15.4%. The total area covered with the 10 largest sites (eight of these being marine protected areas) makes more than 20% of the global area currently protected (32,868,673 km^2) (Deguignet et al., 2014). By April 2016, World Database on Protected Areas (WDPA) records 217,155 protected areas appointed from 244 countries and territories included, with 202,467 being terrestrial and 14,688 marine protected areas (UNEP-WCMC, IUCN, 2016). The increase in number of protected resources with specified years can be seen in Figure 1.

Figure 1. Evolution of the terrestrial and marine protected area network, in numbers of sites and areas from 1962. to 2016.



Source: UNEP-WCMC, IUCN, 2016; Trišić, Kostić, 2018.

World Database on Protected Areas recorded 14,688 protected marine areas in 2018, covering 4.12% (14.9 million km^2) of global ocean (IUCN, 2018). At the beginning of 2018, there were over 2,200 Ramsar sites that covered more than 2.1 million of

square kilometers, which was a space larger than Mexico (www.ramsar.org). In 2000 alone, 1,023 aquatic habitats were recorded on the list, covering an area of 749,000 km^2 (Eagles, et al., 2001), which was less than half compared to the status from the beginning of 2018. Approximately 65% of the sites from the protected areas' global network are located in the European region. By contrast, Africa and South America are characterized by relatively small number of protected areas (3.3% and 1.6% in total) (Deguignet, et al., 2014). Natural and cultural values on the Man and the Biosphere Programme and World Cultural and Natural Heritage lists are many countries' significant resource of tourist offer. On MAB (Man and the Biosphere Programme) world list there are 669 biosphere reserves in 120 countries, including 20 transboundary sites. Their distribution includes the following: 75 sites in 28 countries in Africa; 31 sites in 11 countries in the Arab States; 147 sites in 24 countries in Asia and the Pacific; 287 sites in 36 countries in Europe and North America, and 129 sites in 21 countries in Latin America and the Carribean (www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves).

The same source indicates that, by 2018, on this list were: Biosphere Mura-Drava-Danube Reserve, Danube Delta in Romania, Doñana National Park in Spain, Kiskunság National Park in Hungary, Ichkeul in Tunis, Amboseli in Kenya, Ohrid Prespa, Central Amazon in Brazil, Golija-Studenica, Bačko Podunavlje since 2017, Mount Olympus, the Hawaiian Islands, Julian Alps, Tara River Canyon, The Black Forest (Schwarzwald) since 2017, and many more. The World Cultural and Natural Heritage list registered 830 resources in 2012. 664 from this number were cultural resources, 162 were natural, 24 were mixed, and 34 were singled out as exclusively endangered ones (Holden, 2013); 1, 092 sites were put under protection, 845 of them being cultural, 209 being natural and 38 mixed ones. 54 sites endangered, in total (UNESCO, 2018; http://whc.unesco.org/en/list/). According to the UN definition, National Park is an area of interest for science, education, recreation and tourism. In order for the given area to receive such a status, it needs to have certain surface in its possession, implying a minimum of 2,000 ha, in which: one or more ecosystems exist, undisturbed by human work and presence; in which there are plant and animal species, geomorphological phenomena, settlements of a specific scientific, educational and recreational interest or landscapes of exceptional beauty; in which there are state authorities to prevent exploitation or settling the national park complex, and they work on preserving ecological, geomorphological and esthetic values, for which the national park received its status; and in which visits are allowed, under special terms (for cultural, educational and recreative purposes) (Štetić, Šimičević, 2015).

In the territory of Serbia, different protection measures have been undertaken, in accordance with the adopted European status. In 1839, the first nature conservation act was passed. That was a Decree on the Protection Forest, prohibiting the cutting of "linden mountains". In 1874, on the territory of Serbia, Obed pond received protection status, thus representing the first form of site-based conservation in our country. First National Park Fruska gora was founded on 23rd December, 1960, by adopting the legal

act in the Parliament of the Republic of Serbia. The reasons for the establishment are: protecting natural beauties, historic monuments, flora and fauna and soil characteristics (Lazić et al., 2008).

By 2016, after establishing the protection regime, Serbia had about 463 natural resources protected on a space covering more than 6.54% (578,705 ha) of its territory. According to this criterion, it is classified among European countries as a relatively small share of area under the protection of natural heritage, within national territory surface. By 2016, 5 national parks, 71 nature reserves (strict and specialised), 16 nature parks, 42 natural areas around immovable cultural heritage sites, 16 landscapes of exceptional beauty and 313 natural monuments (botanical and dendrological, geomorphological, geological and hydrological ones) were put under protection (Lekić, Jovanović, 2017). Ten areas that enrolled in the list of swamps of international importance had acquired the international protection status - Ramsar sites, with an area of 63,919 ha. These include: Stari Begej-Carska Bara, Obedska Bara, Zasavica, Ludaš lake, Slano Kopovo, Gornje Podunavlje, Vlasina, Peštersko polje, Koviljsko-petrovaradinski Rit and Labudovo okno (Delić et al., 2017; http://www.zzps.rs). The same source identified: 42 internationally Important Bird Areas (IBA), 61 internationally Important Plant Areas (IPA) and 40 significant butterfly areas in Europe (Prime Butterfly Areas in Europe – PBA).

The governments of the countries have a large number of possibilities at their disposal, that can prevent negative impact of tourism. On a national, regional and local level, a large set of policies, planned measures and activities preventing bad effects can be implemented. They include the following examples: constituting protected areas by legislation, establishing status of national parks and applying for international recognition of significant sites, such as World Heritage. Furthermore, enforcing planning measures for the site use, by implementing zoning, carrying capacity and using limits of acceptable changes. For certain types of projects, environmental impact analysis is mandatory. Likewise, it is necessary to encourage coordination between government departments in implementing environmental protection policy and engaging in dialogue with the private sector, in order to encourage the adoption of management goal, such as environmental audit and environmental system protection development (Holden, 2008). It is significant to mention that, in the concept of national park management, the management planning goal is to define terms for its arranging and governing, thus increasing possibilities for recreation, protection of park resources and ensuring the public is involved in environmental protection (Jelić, Tomićević-Dubljević, 2015).

The rapid growth of tourism industry in previous years increased the need for more efficient development of tourism management. Tourism generates various effects, both positive and negative, on economy, society and environment around the world. In studying the impact of tourism on environment, a comparative method was used, comparing experiences of foreign tourist destinations. Special attention is paid to integral approach of tourism planning, spatial planning aspects of tourism development and environmental management programs in tourism areas. Despite of tourism playing vital role in many countries' economy, official statistics often fails to provide a

comprehensive overview of all the benefits and negative impacts. It can be concluded that the tourism industry is very diverse and that various participants are involved in the provision of tourist services and tourism development and management (Trišić, 2012). The interdependence of tourism as a social phenomenon and the environment is inseparable. Under the influence of all social activities and tourism, the environment is changing and modifying, adapting to basic human needs, among which is the tourist need. Each negative environmental change, bearing consequences, is referred to as environmental degradation (Štetić, Trišić, 2018). Given that all natural or cultural resources differ in their time of origin, the extent of value, uniqueness, degree of endangerment and level of damage, IUCN has established categories and types of protected resources. These categories include:

- Category I - Strict Nature Reserve/Wilderness Area: Protected area managed mainly for science or wilderness protection purpose;
    - Category Ia - Strict Nature Reserve: Protected area managed mainly for scientific purposes;
    - Category Ib - Wilderness Area: Protected area managed mainly for wilderness protection purpose;
- Category II - National Park: Protected area managed mainly for ecosystem protection and recreational purposes;
- Category III - Natural Monument: Protected area managed mainly for conservation of specific natural features;
- Category IV - Habitat/Species Management Area: Protected area managed mainly for conservation through management intervention;
- Category V - Protected Landscape/Seascape: Protected area managed mainly for landscape/seascape conservation and recreation;
- Category VI - Protected Resource Management Area: Protected area managed mainly for the sustainable use of natural ecosystems (Leung et al., 2015).

Tourism and recreation are permitted in all protection areas except in strict nature reserves Ia. Prohibition of using specific parts of nature in tourism is primary, for the sake of site protection. However, these often include the most attractive tourist sites, that can have multiple economic effects on local community. This is one of the biggest issues, since the tourism economy is still not ready to satisfy all protection requirements, and enable tourist movements in protected areas, without bringing destruction and devastation. 'Classic' tourists still haven't developed enough 'ecoconsciousness', that would impact their adequate behaviour in protected sites (Štetić, Šimičević, 2015).

Zoning

The purpose of tourism zoning is to use certain territories through equal distribution of tourist capacities, with some territories being exempt from tourist development and others reduced to a certain level, so as to put pressure of tourist traffic or visitors on other less known yet attractive zones (Stamenković, Stojanović, 2009). Tourist movements and individual activities are allowed in every protected natural site, but without implying negative impact on the site and the environment. Some of these sites have more or less sensitive zones, compared to other parts of the same site. In this way, all parts of a protected resource cannot withstand the same pressures. For this reason it is crucial implementing site zoning, which should represent organizational strategy for using specifically protected territories in tourism through even distribution of tourist capacities, in order to preserve natural environment. World Tourism Organization (UNWTO) highlights four important zones in protected natural resources. These include:

- *Strict Nature Reserve* – in which tourist presence isn't allowed;
- *Wildlife Zone* – where tourist movement is allowed only by walking;
- *Tourist Zone* – tourist movement is allowed in several non-degrading ways. Motor vehicles are also allowed, but only the ones using less harmful fuels and producing low pitched noise.
- *Managed Resource Zone* – where hospitality and tourism facilities are located, with strict control measures, in order to avoid environmental pollution and environmental values being damaged (Stojanović, 2011).

The book *"Environment and Tourism"* offers an example of zoning carried out by Canadian national park service. This institution established 5 protection zones within protected areas.

- *Zone I – Special preservation*, includes strictly protected or endangered species, where human access must be strictly controlled;
- *Zone II – Wilderness*, represents 60 to 90% of an area inside the territory, within which protection is the primary goal, where services are fairly limited for visitors;
- *Zone III – Natural environment*, functions as a zone of mitigation between the second and the fourth zone, and the access to this zone is denied for motor vehicles only;
- *Zone IV – Outdoor recreation*, that includes accommodation services and especially campsites;
- *Zone V – Park services*, covers only 1% of the park territory and it is significantly modified for the purposes of providing various services for visitors (Holden, 2008).

The next important analysis deals with the zoning of Great Barrier Reef in Australia, its total length being 2,000 km, representing a habitat of 350 coral species, 1,500 fish and turtle species, as well as many other living world forms. The airports in Townsville and Cairns made possible the arrival of a large number of tourists. The influx of an increasing number of visitors began to endanger this extremely sensitive marine landscape. The marine park management has established four zones:

- *Preservation (Pink) Zone*, where any type of activities with fatal consequences is excluded;
- *Scientific Research (Orange) Zone*, in which strictly controlled scientific research is allowed;
- *Marine National Park (Green) Zone*, in which scientific, educational and recreational activities are allowed;
- *General Use (Light Blue) Zone*, in which recreational commercial fishing is allowed (Holden, 2008).

The zoning master plan of this area was executed on 1st July, 2004, reducing all previous zoning and protection plans. Great Barrier Reef Marine Park is world's largest protected marine area, after Australian government increased control over the protected area in which fishing and sand mining control had increased from 4.6% to 33.3% of protection in total. The area is divided into 70 bioregions, 30 of them being bioregion ridges, and 40 being unregulated bioregions, each with its own rules and regulations. In 2006, a revision was made of the *Great Barrier Marine Park Act 1975.* Some revision proposals were indicating that there shouldn't exist any changes of zoning plans until 2013, and that every 5 years an *Outlook Report* should be published, examining the state of Great Barrier Reef, the reef management and environmental state under pressure (Wearing, Neil, 2009).

It is important to analyze an exemplified model of protection on a Greek island Zakynthos in which, by applying different measures, the marine ecosystem and rare sea turtle species (*Caretta caretta*) are protected. Zakynthos is vital but fragile ecosystem because 80% of *Caretta caretta* endangered species that live in the Mediterranean are nesting on the beaches of the Laganas Bay. For this matter, after long-term intensive impact of several conservatory groups, such as MEDASSET, ARCHELON STPS and WWF, Greek government has formed the Presidential Department for establishing National Marine Park on Zakynthos in 1999, in order to protect sea turtles. This park includes three marine zones – A, B, C – in the Laganas Bay, strictly protected nesting zones, and protected terrestrial zones with peripheral zones. Several activities, such as fishing and construction, are limited entirely for the sake of ecosystem protection. Bars, restaurants and other activities aren't allowed on the beaches with nests. There are no pedal boats or canoes for rent, and the number of visitors is controlled by time constraints. The number of beach chairs on Gerakas beach dropped from 180 to 100. More than 60% of visitors have become aware of basic steps to avoid impact on sea turtle nests, i.e., the entire beach waste is to be removed including cigarette ends found

5 m away from water (Sigala, 2013; Ryan, 2003). A special tourism framework of preserved parts of nature was provided by *Duffus* and *Dearden*. The model contains three components: Species/Habitat, Tourist and Historical Relationship. The model represents a combination of tourism life cycle, leisure specialization continuum and concept of acceptable change. The model of tourism of preserved nature parts implies that in the intial development stage of such destinations, specialized and professional tourists take dominance by meeting their needs in fully respecting and enjoying the wild environment. However, with the increased popularity of certain environmentally protected destinations, the number of non-specialized tourists also increases, and the basis of their satisfaction lies in personal participation and performing activities that are less connected with conserving nature, when they should be, in fact, observing and merging with wild environment.

Zoning in the Republic of Serbia is closely connected with *Law on Nature Protection* ("Official Gazette of RS", no. 36/2009, 88/2010 and 91/2010 – corr. and 14/2016), according to which the following protected natural resources are defined:

1) Protected landscapes - strict natural reserve, special natural reserve, national park, natural monument, protected habitat, landscape of exceptional characteristics, nature park;
2) Protected species – strictly protected wild species and protected wild species;
3) Mobile protected natural documents.

In protected natural resources of Serbia, zoning is also used through protection regimes. Within their limits, the Ia, Ib, II or III protected area categories are established.

- *Ia category* – prohibits taking advantage of natural resources and all other forms of the area use and activities, unless they are listed as scientific research and controlled education;
- *Ib category* – allows exclusively scientific research, controlled education, and activities aimed at preserving and promoting the existing state of ecosystem;
- *II category* – allows management interventions, for the purpose of restoration and revitalization and overall improvement of the natural resources, without leaving consequences for the primary value of natural habitat, population and ecosystem, as well as controlled traditional values, which during their process, cannot bring damage to primary values of the area;
- *III category* – allows selected and limited use of natural resources, management interventions for the purpose of restoration, revitalization and overall improvement of the natural resources, sustainable use, development and improvement of rural households, arrangement of cultural and historical heritage facilities, preservation of traditional activities of the local community, infrastructure development intended for tourism development in accordance with sustainable development goals (*Law on Nature Protection,* 14/2016).

In its regulations, the *Law on Tourism* of the Republic of Serbia also deals with the issue of landscape preserving and planning, primarily from the economic and development aspects, especially determining tourist site as a unique and indivisible geographic and functional unity, of natural and created resources, significat for the tourism and its development (Slavković, 2015).

Carrying capacity

Under the indicators of sustainable tourism development, many authors emphasize carrying capacity as one of the key components of development, with critical points of influence such as: airport, tourist attractions, drinking water supplies, wastewater, protected species, use of protected areas, pollution and emissions of harmful gasses, where special emphasis is put on these destination elements (Holden, 2008).

Estimation of carrying capacity is used as an indicator of tourism impact on environment in tourist sites and regions that represent, at the same time, important planning component of site tourism development. Given that the majority of negative ecological effects and other issues are caused by high density of visitors, tourist capacities and contents, many authors deal with determining the maximum number of tourists that can simultaneously stay in a certain spatial scope. By analyzing available data, a conclusion can be drawn that carrying capacity in global sense represents maximum number of people who can be located in one particular site, without having negative impact on the destination in each aspect of activity. UNWTO defines three levels of estimation of carrying capacity, and these include:

- *Environmental capacity* – which implies the maximum level of tourist use of the site without causing ecological degradation. Its estimation includes complex consideration of a number of factors such as ecological, geomorphological and climate characteristics, the number of tourists, their activities, construction of tourist facilities, infrastructure, and economic factors.
- *Psychological capacity* – represents maximum degree of spatial usage, from the aspects of the number of tourists, their activities and built facilities, with decreasing quality of tourist experience.

Table 1. Carrying capacity for tourist destinations and activities according to the European Union standards

type of recreational area		suggested capacity per day
mountainous area	ski center	100 skiers per hectare of ski trail
protected natural area	woodland area	up to 15 persons per hectar
	park in suburbs	15-70 persons per hectar
	hiking	40 persons per kilometer of trail
	riding	25-80 persons per kilometer of trail
	big picnic	300-600 persons per hectar
	small picnic	60-200 persons per hectar

Source: Vujović et al., 2012

This capacity isn't easy to determine given that the perceptions and attitudes of visitors about the aforesaid factors always differ, which is a consequence of wishes, tastes, information and expectations.

- *Social capacity* – implies the maximum possible tourism development, including the number of tourists, their activities, construction of facilities and infrastructure, which will not harm the lifestyle, culture and tradition of domicile population (Vujović et al., 2012). This capacity can be estimated as the most abstract one, and it is the hardest to estimate (Holden, 2008).

Beside these three listed capacities, some authors also include:

- *Economic capacity* – representing local economy level of dependence from the degree of tourism development, with the fact that it is not desirable for this dependence to be big.

In certain destinations and in cases when all carrying capacities are positive, a conclusion can be drawn that the *final capacity* has been achieved. The concept of final (absolute) capacity is one of the basic elements of strategy of sustainable tourism development, through which positive economic, social and ecological results in a destination can be achieved. Absolute carrying capacity of tourist destination consists of spatial, biological, social and psychological aspects of the environment in tourism. One of the most famous uses of absolute capacity concept in tourist literature has been developed by Butler, by modifying life cycle concept, in order to apply it on a tourist destination. According to the theory, the increased number of visitors in a certain area can rapidly result in decreased visits, and the outcome of this is the limit of final (absolute) carrying capacity. It is concluded that the destinations are going through a fairly equal transformation over time, from early research and activation, to consolidation and stagnation, regarding market changes, in order for more visits and competitive destinations to be allowed (Fennell, 2015). A special approach is required at high visitation zones, that put up with the biggest pressure at the same time, and are prone to change ecological balance. In order to estimate the carrying capacity, it is necessary to determine optimal tourist standards, their activities and built facilities, for each tourist site or region individually.

Conclusion

Tourism research is successful in identifying vast number of social and ecological problems, brought by tourism industry. This dialog is led by different subjects of system protection, and it has become so intensive, that organizations are ready to go even further. This research paper notes meaningful subjects on a global level, and it can be concluded that they have an important, almost unique role in environmental system protection worldwide. Many countries' concern has been invested in site protection models. The aforesaid data draws a conclusion about the ongoing increased number of protected areas, seen as a result of pressure, damage and prevention, humanity's readiness and taking interest in site protection. Through numerous examples, it can be concluded that

adopting legal acts and status, zoning and carrying capacity are of crucial importance for system protection. All of them have an impact on tourist activities, attractions and consequences of action, in a direct or indirect way. Protected zones put restriction on movements and on the capacity of number of visitors at a certain time interval, whereas legal regulations establish protection and sanction negative influences. The absence of merely one of these system protection models leads to conflicts. Alongside of many tourism impacts on economy, social and natural environment, it is necessary for the sites in which tourist movements occur to be subjected to the process of planning and protection, in order for tourism to be a positive factor in natural and social environment prosperity. Theoretically, the protection of natural resources in the Republic of Serbia is carried out through professional monitoring, determination and directing of measures of active protection, evaluation of phenomena, processes, natural objects and areas, as well as the adoption of appropriate conservation acts. Only future research will show what will be the outcome of these models in terms of preventing negative impacts of tourism on the environmental system protection, and whether this protection is going to be sufficiently implemented, controlled and monitored.

Conflict of interests

The authors declare no conflict of interest.

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THE ANALYSIS OF THE AARHUS CONVENTION IN THE CONTEXT OF GOOD ENVIRONMENTAL GOVERNANCE

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ABSTRACT

The purpose of this article is to examine mechanisms for public involvement in environmental governance from the perspective of the Aarhus Convention. Analysis method explained the connection between the basic postulates included in the Aarhus Convention and the main principles of good governance in environmental matters. Normative methods presented the provisions of the Aarhus Convention related to the right to an adequate environment and rights of access to information, public participation, and equal access to justice. By using the same method, the special attention was devoted to the transposition and implementation of the requirements of the Convention into the legal system of the Republic of Serbia. Through the case study research method, the authors examined the relevant practice of the Compliance Committee. Authors conclude that transposition of the requirements of the Aarhus Convention represents a valuable contribution in establishing good environmental governance.

Introduction

There is a growing acceptance that the concept of good governance includes the participatory democracy as its crucial component. Participation of the public in decision-making process has a significant impact on the improvement of quality of the resulting decisions and the credibility of this process (OHCHR -The Role of the Aarhus Convention in Promoting Good Governance and Human Rights).

Law and policy for ensuring the environmental protection, in most countries, basically rely on governments and public authorities. Crucial segments of governance mechanisms

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concerning the implementation of environmental legislation refer to transparency and public participation. The full engagement of public administration and civil society in the environmental policy making process is clearly perceived as the main purpose of the Aarhus Convention on Access to Information, Public Participation in Decision – Making and Access to Justice in Environmental Matters (Pallemaerts, 2011). The importance of the Aarhus Convention lies in its binding obligations on public authorities to ensure the right to an adequate environment through the three procedural rights, right to environmental information, right to participate in environmental decision-making and the right to access to justice in environmental matters.

The Aarhus Convention was negotiated within the framework of the UN Economic Commission for Europe (UNECE) and signed by 35 member states and by European Community at the ministerial conference "Environment for Europe" in Aarhus on 25 June 1998. This multilateral treaty entered into force on 30 October 2011, following ratification by 16 states. At this moment, the Aarhus Convention has 47 contracting parties, including the European Union.

Regarding the implementation of the rights provided by the Aarhus Convention, Article 3 establishes minimum standards, prescribing the obligation of states to take legislative, administrative and other measures in order to implement the provisions of the Convention. In addition, Article 10 provides for the obligation of states parties to hold meetings at least once in two years, as well as to submit regular reports on the implementation of the Convention. Article 15 states that states will form "on a consensus basis, optional arrangements of a non-confrontational, non-judicial and consultative nature for reviewing compliance with the provisions of this Convention".

Parties to the Convention established the Compliance Committee as innovative mechanism for reviewing compliance with the Convention. The Compliance Committee represents unique compliance mechanism in the field of international environmental law, since the individuals and groups are entitled to make communications concerning a Party's compliance with the provided obligations. The Committee is not judicial body issuing binding decisions about state responsibility for breach of the Convention; thus, it rather makes recommendations to the parties. The mandate of the Committee comprises not only consideration of communication on compliance; it may also prepare reports concerning the implementation of the Convention (Morgera, 2005).

The main research question in this paper is referring to the analysis of the basic postulates of public participation in environmental governance according to the provisions of the Aarhus Convention. Therefore, the special attention will be devoted to the following issues:

- the right to an adequate environment
- the right to an access to environmental information
- the right to participate in environmental decision-making process
- the right to access to justice in environmental matters.

An innovative dimension of the Aarhus Convention is referring to its transboundary character, which would represent a special subject of research in the paper.

Methodology

The main objective of this article is to examine from the perspective of the Aarhus Convention, mechanisms for public involvement in environmental governance. Analytical methods will be used to explain the connection between the basic postulates included in the Aarhus Convention and the main principles of good governance in environmental matters. Normative methods would presents the provisions of the Aarhus Convention related to the rights of access to information, public participation, and equal access to justice, as well as to the transboundary characteristics of the Convention, as its crucial segments in the light of establishing good governance. By using the same method, special attention would be paid to transposing and implementing the requirements of the Aarhus Convention in the legal system of the Republic of Serbia. Using the case study research method, authors of the article will examine relevant practice of the Compliance Committee in order to understand the implementation of complex requirements defined by the Arhus Convention in the legislative framework of States Parties. The above-mentioned methods will provide researchers with an opportunity to analyze the data with reference to the original research questions.

Right to an adequate environment in the light of environmental governance

The Aarhus Convention creates linkages between human rights and protection of environment. The parties to the Convention have legally recognized a human need for adequate environment in the form of human right (Etinski, 2013). Therefore, the Aarhus convention represents the most ambitious effort to create international legal standards within the sphere of the environmental human right.

The Convention guarantees the right to an adequate environment in the preamble and in Article 1, stating that "every person has the right to live in an environment adequate to his or her health and well-being, and the duty, both individually and in association with others, to protect and improve the environment for the benefit of present and future generations". The above formulation differs from the standard approach contained in human rights regulations. Human rights generally imply a certain obligation of states that correspond to the rights of individuals. In order to realize this obligation, the state can impose certain obligations on individuals in the context of respecting human rights. Unlike above approach, the Aarhus Convention provides for the duty of individuals to protect and improve the environment through the enjoyment of human rights included in the Convention. Regardless to the fact that the text of the Convention contains the term "duty", it is, first of all, the right of an individual. The reasons for the use of this term can be seen from an aspect of the moral obligation of individuals in terms of their initiative regarding the protection of the rights envisaged by the Convention, in order to enable the enjoyment of the same rights for future generations, as well as to realize a higher level of environmental protection (Mladenov, 2017).

Trounsboundary character of the Aarhus Convention

Environmental issues necessarily imply a global dimension and a transboundary nature; thus it is not possible to reduce the protection of the environmental human right to the framework of internal legal systems. For this reason, states are obliged, in fulfilling their obligations, to abandon the criteria of territorial jurisdiction and to ensure the exercise of this human right beyond the boundaries of their territory.

The parties to the Aarhus Convention have recognized the fact that their acts or omissions in the field of environmental protection may produce effects beyond national borders. Therefore, individuals may also require the protection of the rights proclaimed by this treaty before the Committee in order to consider compliance with obligations under the Aarhus Convention by contracting parties, regardless of the criteria of the territorial jurisdiction of states.

The Aarhus Convention foresees the transboundary element as a distinctive feature of the human right in question. Protection of the rights provided by the Convention, cannot be defined only as a legal relationship between a state and an individual under its territorial jurisdiction. The above thesis is confirmed by Article 3 of the Aarhus Convention stating that " the public shall have access to information, have the possibility to participate in decision-making and have access to justice in environmental matters without discrimination as to citizenship, nationality or domicile and, in the case of a legal person, without discrimination as to where it has its registered seat or an effective centre of its activities".

Therefore, concerning the violation of the right to an adequate environment, individuals would be obliged to prove that a particular activity has led to breach of the relevant environmental conditions prescribed by law, regardless of the issues referring to nationality or the place of residence (Bastmeijer and Koivurova , 2008).

Access to environmental information

The right to information on the environment represents the first "pillar" of the Aarhus Convention, provided by Articles 4 and 5 of the Aarhus Convention. The Convention envisages this right through the passive and active right to information. Active right is established by Article 4 which states the ability of the members of the public to request access to environmental information in the possession of state authorities, without having the obligation to express a legitimate interest. The article makes clear that the environmental information shall be available within one month after the request has been submitted or latest within two months if this extension is based on the volume and complexity of the information. Request for environmental information may be rejected according to the reasons provided by Article 4. As a special ground for the refusal of the information, Convention states the fact that the information in not in the possession of public authority or the possibility that disclosure of the regarded information would involve certain aspects of the confidentiality concerning international relations and public security. Parties have a duty to interpret reasons for refusal in a restrictive way and to consider whether the regarded information relates to the environmental emissions.

Passive right to environmental information is established by Article 5 of the Convention which relates to the collection and dissemination of environmental information by public authorities. Article 5 obliges the parties to establish mandatory systems for obtaining information on proposed and existing activities that could have a significant impact on the environment. In addition, Article 5 states that parties of the Convention will require regular reports concerning the environmental impact of those entities whose activity have a significant impact on the environment. Both aforementioned obligations also apply to the private sector. Article 4, as well as Article 5 state that provided obligations are enacted within the framework of national legislation, which allows parties to the Convention significant discretion to decide which information should be withheld (Mason, 2010).

The practice of the Compliance Committee includes a significant number of cases alleging that the states parties failed to comply with Article 4. The violation of the same article was established by this body for a variety of reasons.

The Committee found that Romania breached obligation under Article 4 since this state refuse to ensure access to information contained in a study on the environmental impact assessment. Romania claimed that regarded information is part of the scientific study protected by copyright, thus its publication is only possible with the consent of the author. The Committee concluded that the failure of publication of this study, based on intellectual property rights, should not be allowed due to the fact that it is prepared for public participation in the administrative procedure (Andrusevych et al., 2011).

In the case against Spain, the Compliance Committee decided that the refusal of a public authority to provide the environmental information in the form requested by the requestor, a CD for a cost of 13 Euro instead of paper copies in the amount of 600 pages for a cost of 2.05 Euro per page represents the violation of the Article 4 of the Convention (Andrusevych and Kern, 2016). Regarding the deadline within state authorities are obliged to respond to the request, the Compliance Committee pointed out that the response must be made within a maximum of two months, regardless of the fact whether the requested information became available to the public by its publishing on the website (Zengerling, 2013).

Public participation in environmental decision-making

The right to affect decision-making is one of the most significant components of civil and political rights. This right has been emphasized by the Convention and protected through binding rules according to which parties have a duty to provide opportunities for the public to submit comments and opinions relevant to the proposed activity (Davies, 2007).

The right of the public to participate in environmental decision-making process is regulated within the framework of Articles 6, 7 and 8 of the Convention. This right is achieved through specific activities, drafting of plans, programs and policies, as well as in the field of executive regulation. Specific activities include those listed in Annex I to the Aarhus Convention, as well as all activities that may have a significant impact on the environment. The Convention requires the interested public to be informed at an early stage of the decision-making process when it can exercise effective participation.

According to Article 6 of the Convention, States parties are obliged to notify the public concerned, inter alia, about the proposed activities, the nature of possible decisions, the envisaged procedure, the time and place of holding each public hearing, the opportunities for the public to participate. Furthermore, states should ensure that decisions taken in the proceedings manifest the results of public participation. The public has no power to veto a decision, however, the decision-making body cannot simply dismiss the comments and opinions of the public without serious consideration.

It is important here to make distinction between "public" and "concerned public" in the context of the interpretation of the conditions concerning legal standing. Article 2 of the Convention states that the category "the public" is referring to "one or more natural or legal persons, and, in accordance with national legislation or practice, their associations, organizations or groups". The "the concerned public" is defined by the same article as members of the public affected or interested in the environmental decision making.

Article 7 of the Convention regulates the participation of the public relating to plans, programs and policies in the field of environment. It is stipulated that States parties should draw up adequate measures for public participation in the process of preparing plans, programs and policies relating to environmental issues in a transparent framework.

Article 8 of the Convention prescribes public participation in the preparation of executive regulations and other generally applicable legally binding rules that may have a significant impact on the environment. In the context of the exercise of that right, parties to the Convention should take certain measures to make the draft of the rules available to the public, as well as measures to ensure the public participation in the hearing. Regardless of the fact that the Aarhus Convention does not apply to legislative bodies, Article 8 can be applied to the executive phase of drafting the rules, although they must be adopted by parliament later.

Article 6 and Article 7 have been the ground for a significant number of the decisions by the Compliance Committee. The Committee considers it important to point out that determination whether certain decision is referring to Article 6 or 7 could be difficult. However, the Committee found that it is significant "to identify what the legal effects of an act are — whether an act constitutes a decision under article 7 or a first phase/intention for a planned activity under article 6, because only some of the public participation provisions of article 6 apply to decisions under article 7" (OHCHR - Individual Report on the Convention on Access to Information, Public Participation in Decision–Making and Access to Justice in Environmental Matters, 2013).

In the view of the Committee, Armenia did not adequately implement its obligation in Article 7 of the Convention by failing to ensure the possibility for the public to participate in a procedure determining the manner of use of a particular land through an act of the executive authority. In an application against Slovakia, the Austrian NGO claimed that Slovakia had violated the obligation under Article 6 of the Convention, based on the fact that the public authorities did not involve the public in the decision making process concerning the construction of a nuclear power plant in Mohovce. The

Compliance Committee concluded that such a failure of Slovakia represents a breach of Article 6 (Andrusevych et al., 2011).

Public participation in decision making process is one of the crucial components of a democratic society, which gives full legitimacy to the decisions made by the authorities. However, this procedure raises numerous challenges in practice for the parties to the Convention. Motivation of the public to participate in procedures, slowing down the decision making process due to the involvement of the wider public, and increasing the overall costs of implementing the procedure, represent only some of the difficulties encountered by the countries (Mladenov, 2017).

Access to justice in environmental matters

Access to justice is one of the major components of the development of environmental governance and the law of sustainable development on domestic and international levels (Stec, 2003). Article 9 secures an access to review procedures – judicial or administrative. The right to access to justice in environmental matters is guaranteed by Article 9 of the Convention. The provisions establishing this right shall apply in cases where any of the previous two rights, which are covered by the Convention, have been violated.

The scope of Article 9 actually covers three separate rights. Article 9(1) states that the members of the public, who has requested environmental information have an access to review procedure before a court or another independent and impartial body established by law, in order to examine whether a party was complying with Article 4 of the Convention in its treatment of the request. In accordance with the Article 9(2) the concerned public should have an access to review procedures to challenge the procedural and substantive legality of any activity listed in Annex I. Article 9(3) provides the public with an "access to administrative or judicial procedures to challenge acts and omissions by private persons and public authorities which contravene provisions of its national law relating to the environment".

The first paragraph of Article 9 refers to review procedures for the protection of the right to environmental information, while the second paragraph of the same article refers to access to justice in relation to the right to participate in environmental decision-making process. The third paragraph states that parties to the Convention shall ensure to members of the public the right to review the compliance of the acts of natural persons or public authorities with the provisions of national environmental law, in the form of administrative and judicial proceedings, when they meet any conditions prescribed by domestic law. In the next paragraph of the same article, a request was made to provide adequate and effective remedies and court interim measures in the above mentioned procedures, and that decisions made pursuant to this article are in written form and made available to the public. It further states the obligation of the states parties to make information on the possibility of initiating administrative and judicial procedures for the use of remedies available to the public.

The practice of the Compliance Committee in regard to Article 9, includes cases concerning the non-compliance by parties with the duties to provide appropriate and effective remedies, as well as the procedures that are fair, equitable, timely and not prohibitively expensive (Treves et al., 2005). In formulating the requirement that procedure should be fair, the Committee pointed out that it refers to fairness for the claimant, not the defendant (ACCC/C/2008/27, ECE/MP.PP/C.1/2010/6/Add.2).

The basic postulates of the transposition of the Aarhus Convention into the legal system of the Republic of Serbia

The Republic of Serbia ratified the Aarhus Convention in 2009 with adoption of the Law on Ratification of the Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters. Provisions of the Convention are included in most of Serbia's existing legislation, establishing greater openness in environmental matters and contributes towards society's goals of sustainable development (Strategy for Implementing the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters – The Aarhus Convention, 2011).

Right to environmental information is guaranteed by the Constitution of the Republic of Serbia from 2006 in the Article 74. Law on Free Access to Information of Public Importance provides a realization of constitutionally guaranteed right to information. In this sense, the scope of information of public importance is determined, as well as a specific legal regime of the right to access information of public importance.

Law on Environmental Protection states the obligation of public authorities to inform the public about the state of the environment, as well as about warning measures or the pollution that can pose a threat to human life and health. Under Article 79, the same law regulates various issues related to the provision of environmental information at the request of natural or legal persons, while Article 80 establishes grounds for rejecting this request.

Furthermore, the Nature Conservation Law in Article 115 states the obligation of the authorities to provide access to information regarding the protection of the nature, except in cases concerning the confidentiality of the proceedings of public authorities in accordance with the national law.

Public participation in environmental decision-making is established as one of the fundamental principles in the Law on Environmental Protection. In accordance with this act, the public has a right to participate in decision making about: environmental impact assessment of projects whose realization may result in environmental pollution or threat for environment and human health; strategic assessment of plans and programs on environment, and approving new or existent installations.

In addition, public participation represents significant component of the provisions of the Law on Environmental Impact Assessment. This act guarantees the right to environmental information to the concerned public in all three phases of the

environmental impact assessment process. The competent authority, when deciding on approval of a EIA Study, is obliged to take the opinion of public into account and notify it on the decision made, the main reasons on which the decision is based, and on the most important measures that the project manager shall undertake in order to prevent, reduce or eliminate harmful influences (Drenovak Ivanović, 2011).

Concerning the implementation of the provisions included in Article 9 of the Convention, current legislation in Serbia has two modes of legal protection in environmental matters in administrative proceedings. The first relates to the protection of rights before the competent administrative body and realized investment appeal as a regular legal remedy, while the second mode of legal protection in environmental administrative matters is related to the possibility of inspection that is initiated by filing an application to the competent administrative authority (Drenovak Ivanović, 2011).

Review procedure requirements relating to information requests provided by Article 4 of the Convention are established by Law on Environmental Protection, Law on Environmental Impact Assessment and Law on Integrated Pollution Prevention and Control. The same legal framework provides the access to justice related to the review of decisions on public participation under Article 6 (Strategy for Implementing the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters – The Aarhus Convention, 2011).

Concluding remarks

The significant component of the environmental protection is referring to governance and competent authorities that have a strong influence toward the realization of the environmental policies and actions, as well as in achieving outcomes in this field. The good environmental governance is needed in order to address the most urgent environmental challenges that represent the significant threat to the humanity and its survival.

One of the most important objectives of the Aarhus Convention refers to protection of the planet and its ecosystems by creating participatory democratic system. Therefore, the Convention represents the shared concern of the parties to ensure government accountability and responsiveness in the environmental field. The transposition of the requirements of the Aarhus Convention represents of a valuable contribution to the process establishing good environmental governance. By creating a linkage between human rights and environmental issues, the Convention develops public participation in environmental governance to the level of a special human right to an adequate environment that is exercised through three particular rights in environmental matters – access to information, to participation in decision-making and access to justice. The protection of the right to an adequate environment, as legal recognition of human need to live in environment that is adequate for human health and well-being, represent the ground of the Aarhus Convention to strengthen the democracy and transparency of the public authorities in the field of environmental protection.

By establishing the Compliance Committee, as innovative compliance mechanism, members of the public have an opportunity to seek remedies at the international level concerning a compliance of the parties with the provided obligations. In the light of above fact, the citizens could determine the future success of the Convention as an important instrument that should contribute to more efficient environmental protection and realization of the principle of sustainable development.

The Republic of Serbia ratified the Aarhus Convention in 2009. Provisions of the Convention are mostly implemented into the legal system of the Republic of Serbia, establishing greater openness in environmental matters by creating the possibilities for the citizens to control public authorities and to make important contribution to the protection of environment.

Finally, in order to establish an effective legal framework in the context of the dealing with the growing environmental crisis, the protection of the rights provided by the Aarhus Convention, must be based on an empowerment to the civil society, improving public environmental awareness and the demand for public participation in decision-making processes that could affect their lives, as well as the environment and its sustainability.

Conflict of interests

The authors declare no conflict of interest.

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CONCERNS ABOUT HAMONIZATION PROCESS OF SERBIAN AGRICULTURAL POLICY WITH EU STANDARDS

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A R T I C L E I N F O

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A B S T R A C T

Common agricultural policy (CAP) is the most dynamic segment of the EU legal legacy and the driving force of integration. The role and significance of this sector in the EU's overall economy is to ensure the health of the population, rural development and environmental protection. Agricultural policy has emerged because of longstanding discussions about the need for the national agricultural policies of the countries of Western Europe to harmonize with each other, in order to ensure additional supply of food to the European population after World War II. Because of the exceptional importance of agriculture for economic stability and sustainable development, harmonization national policies with EU Common Agricultural Policy are essential. The specificities of national agriculture must be adequately respected in the legal and institutional arrangements that the country will adopt and apply in the EU accession process; otherwise, there would be deep and far-reaching consequences for those parts of national agribusiness that cannot fulfill the EU requirements. In this paper, throw the analytical and comparative method will be discussed the EU standards in this area, the harmonization level of Serbian agricultural policy with EU standards with special emphasis on negotiating chapter 11 and the institutional and legislative constraints in the EU accession process.

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Introduction

Starting from the fact that the agricultural sector and rural development in the European Union are regulated by a common policy, adapting this policy is a particularly challenging area in the integration process. First, it should be noted that this policy is one of the oldest EU policies. Common rules must meet the different needs of many countries. Common agricultural policy has influenced: increasing agricultural production and productivity, changing the production structure, stabilizing the internal market, increasing exports, importing independence, protecting and increasing producer incomes, supply security, etc. (Babović i Tasić, 2013). Throughout history, CAP had several major reforms, primarily due to the criticism of the over-protection of agriculture (the prices on the domestic market were more than world prices) and too high a budget, which would be a burden for taxpayers. Since the end of the 1990s, reforms have been carried out due to the necessity of respecting the needs of the completely rural area, the protection of the environment and cultural heritage. (Mikuš et al, 2010)

The agricultural sector of Serbia faces with serious difficulties, and its recovery, economic growth and competitiveness of agricultural products, improvement of standards and preservation of the environment, are possible only with the integration and implementation of CPU regulations. In recent years, the Republic of Serbia has launched a process of structural and systemic agrarian reforms (Strategy for Agriculture and Rural Development for the period 2014-2024). Compliance with EU legislation in this area has been initiated with the help of financial programs (SAPARD, IPA, IPARD, etc.). One of the most complex chapters in EU accession negotiations is the Agriculture chapter, as more than one-third of all accession regulations are from this sector. The basic goals of the paper are to establish the current features of the EU Common Agricultural Policy, with a special emphasis on the future development plan, and the implications for the Republic of Serbia and the problems of adjusting EU agricultural policy.

Methods of research and sources of data

Based on the set goals, the analysis of the content of secondary data sources was used as the basic methods of research. Secondary data, information on the CAP history and its reforms were taken mostly from the official European Commission documents and relevant literature. The data on the state of the Serbian agrarian sector, as well as the current and potential problems that the RS faces on the basis of the literature on RS agricultural policy, strategic documents, Serbia's Progress Report on the Accession Process.

Research results

CAP - Historical overview

The common agricultural policy, established by the 1957 Treaty of Rome was the cornerstone of the then European Economic Community (EEC), consisting of France, Western Germany, Italy, the Netherlands, Belgium and Luxemburg. EEC in order to

reduce the risk of food shortages (present immediately after World War II) progressively creates a common marcet, and article 39 of The Rome Treaty for the first time defines the aims of the CPA:

1) raising agricultural productivity by promoting technical progress, rational development of agricultural production and optimal use of production factors, in particular labor,
2) ensuring the standard of living for the agricultural population, in particular the raising of the income of persons who are personally engaged in agriculture,
3) market stabilization,
4) market security,
5) insurance of agricultural products for consumers at reasonable prices.

The policy was established 5 years after signing the contract, because many countries did not respond adequately and interested in a common policy. At the Conference, which was held in 1958, standards are being adopted and first steps are taken towards the implementation of a common agrarian policy. (Živadinović i Milovanović, 2011).

The three principles defined in 1962, on which the agrarian policy is based within the framework of the common organization of the single market, are:

1. Rules on the free movement of goods between member countries (regulation and determination of common price, grant of aid regardless of location of economic entity, implementation of administration and common foreign policy, etc.);

2. Determining the activities of the Union's priorities (prioritization of agricultural products from the Union in relation to those imported from third countries, protection of the internal market caused by disorders in the world and

low prices of imported products from third countries, etc.);

3. Principle of financial solidarity (strives that all costs incurred in the Union, through the application of agrarian policy, must be distributed to all Member States). The European Agricultural Guidance and Guarantee Fund was established in 1964 and financed the implementation of the CAP. *(*Mihajlović, 2011).

Radical proposals for policy reform have been framed within the framework of the Memorandum of CAP Reform, called the Mansholt's 1968 Collegiate Plan, with the emphasis on ensuring the support of farmers to stop dealing with agriculture during the 1970s and at least 5 million hectares by then of cultivated land excluded from production (Stead, 2007). However, no concrete reforms were carried out and in agriculture there was still a problem of continuously growing surpluses. Apart from the costs of storing surpluses and dumping, as a way to achieve greater and faster exports, there have been negative consequences of increased production for environmental protection (eg water pollution, depletion of soil). In 1988, a set aside measure was introduced to encourage

farmers not to produce, in order to reduce market surpluses and restore the ecosystem. (Mikuš et al, 2010) From the 1980s to 1992, facing the European Union with high market surpluses and reducing aid to agrarian (attempt to reduce budgets).

*Agricultue Directorate General - DG VI h*as prepared a paper with analyzes of problems and reform proposals. It was this reform called the *MacSharry reform* that marked a milestone in CAP development, as it proposed lowering the prices of agricultural and food products. The reform also proposed structural measures: early retirement incentives farmers who respect environmental protection in the production and afforestation incentives (Moyer, 1993). From 1992 to 2005, the CPU was based on the policy of direct payments and. increasingly, the policy of rural development (Mihajlović, 2011). This is a significant period for the Serbian agriculture, because then (from 2000 onwards) the first serious steps towards systemic and structural reform begin.

The Commission proposed a reform of the CAP, *Agenda 2000*, which also served as a basis for the development of EU agriculture in the period 2000-2006. Negotiations and agreement on reform of the CPA were concluded in 1999 in Berlin. With the market-pricing measures that made up the first pillar of the CPA, measures were also extended rural development and officially introduced the second pillar - rural development policy. Agenda 2000 was the most extensive reform ever in CAP history.

The reform envisioned: 1) to increase the competitiveness of agricultural products on the internal and global market, 2) to provide a decent living standard for people living in agriculture, 3) creating substitute jobs and other sources of income for farmers, 4) designing a new rural development policy, 5) an ecological way of thinking and structuring the CAP, 6) improving the quality and safety of food, and 7) simplification of agricultural legislation and decentralization administration, so that the rules and procedures become clear, transparent andeasy to use. (Mikuš et al, 2010)

Agriculture has a multinational role. The reform affects the reduction of surpluses and cost control. It affects the improvement of food safety and quality, environmental protection. An adequate training of farmers is carried out. The aim is to find alternatives for employment and new sources of income. The farmers receive direct assistance and subsidies from the funds: ERDF, ESF, EAGGF, FIFG. (Živadinović, Milovanović, 2011)

In 2003, the Member of the European Commission in charge of Agriculture, Franz Fischler, proposed a new Mid-Term Review, according to which existing direct payments, related to different production activities, were converted into a single payment per holding. In total support she prevailed income support, not support for production. The farmer has the right to support whatever the current one production activities but under certain conditions (cross-compliance): 1) preservation of good production condition of the land, 2) Treatment in accordance with environmental protection requirements (protection of wild birds, pollution of water and soil, natural habitats, eco-systems), 3) treatment in accordance with the requirements of human and animal health protection (eg livestock marking, food safety), 4) compliance with requirements animal welfare, 5) placement of land out of use for areas under cereals, 6) areas under permanent pasture

from 2003 are not allowed in the future to become arable land; and 7) certain products that have not been encouraged before, they must not produce on surfaces for which incentives can be generated (except under subsequently certain conditions).

The Health Check reform came into force in 2008, within the programming period (2007-2013). with the task of modernizing and simplifying the CAP, i.e. allowing better responses to new challenges and opportunities facing European farmers.

At its last plenary session in 2017, the European Parliament adopted a legislative resolution that makes the European Union's agricultural policy more straightforward and fairer. The rules adopted will simplify the EU's agricultural policy, strengthen the negotiating power of farmers in relation to retail chains, and better equip them to cope with the risks. The CAP reform, which came into force in 2018, was adopted with 503 votes in favor, 87 against and 13 abstentions. The new rules should strengthen the negotiating power of farmers, allowing all recognized agricultural organizations to plan production and negotiate contracts for the procurement of goods on behalf of their members, without violating EU competition rules. Collections have so far been permitted only in several sectors, such as the dairy sector, the olive oil sector, beef and cereals. Farmers will also be better protected against market volatility and crises, such as bad weather conditions, plant pests or animal diseases. The European Commission will be empowered to react more quickly to crises, with extraordinary measures to support farmers. Young farmers will be eligible for full five years of enjoying the status of young farmers after the resolution enters into force. Member States will have greater flexibility in defining "active farmers", ie, a person entitled to EU subsidizing agricultural holdings. They could also significantly increase additional funding, from 25% to 50% of their basic payments for the first 25-90 hectares, for young farmers, to attract them into the agricultural sector.

Implications of rural development policy to the Western Balkans countries

In 1989, the European Commission set up guidelines relating to the preparation of the countries of Central and Eastern Europe for membership of the Union, which were later integrated into the IPA program, namely:

- PHARE (Program of Community aid to the countries of Central and Eastern Europe). Aid for investment and project management, administrative reform, economic and social cohesion of candidates

- ISPA (International Sleep Products Association). A program designed to build infrastructure for transportation, environmental protection;

- CARDS (Community Assistance for Reconstruction, Development and Stabilization). The program referred to the period from 2000 to 2006 and was aimed at the countries of the Western Balkans, the rebuilding of the region, the reduction of poverty, market reform, interregional cooperation, etc. (Živadinović, Milovanović, 2011).

- Program SAPARD (Special Accession Program for Agriculture and Rural Development) is the successor to PHARE. It was established by the Council of Europe in June 1999, the application of which came into force on January 1, 2000. The program was designed to help 10 Central and Eastern European countries to deal with the structural adjustment of agrarian law with EU regulations. It included investments in agricultural holdings and rural development. The program also referred to investment in landownership and improvement of land quality, afforestation, education and training of farmers, consumer protection, etc. SAPARD defines three priorities: to increase market efficiency; to accept standards on the quality of medical care due to the participation of candidates on the market; to support new jobs in rural areas. The EU has financed up to 75% of the project, and the rest is end users, contractors and private entrepreneurs. The aim was to enable potential candidates to become self-sufficient and to become independent in the management of funds, while not requiring prior approval by the European Commission).

There were a lot of challenges during program implementation. A large number of abuses were committed in the allocation of funds, and they usually ended up with developed farmers. For example, in Bulgaria and Romania, certificates were issued without a direct insight. In Poland, 48% of projects were rejected - due to incomplete documentation. (Stojanovic et all, 2018)

The three major problems of the candidate countries are:

-macroeconomic, a large influx of aid has triggered inflation and exchange rate volatility;

-administrative, at all levels, timely acceptance of projects, coordination of partners and stakeholders, administration, financing and implementation of implementation, etc;

-financial capacities, i.e. the ability to fund programs and support from the EU, the growth of the budget deficit, liquidity (spending of own money, due to a subsequent refund.

By the Directive of the European Council, in 2006, an Instrument for Pre-Accession Assistance (IPA) was established. The program was intended to support candidate countries and potential candidates for the period 2007-2013. The Instrument for Pre-Accession Assistance was focused on two priorities: 1) that countries meet political and economic criteria, to adopt the acquis, to strengthen the judiciary, form administrative apparatus, etc;

2) The second priority was to use the EU structural and cohesion funds after accession. The European Union has provided targeted and effective support, depending on the realization of the development path and the status of accession to each candidate country. The condition for use was a status for membership and an accredited DIS by the European Commission. Funds were obtained based on a pre-planned and elaborated program for the implementation of priorities in EU strategic documents. According to the project cycle module, with five of its phases: programming, indication, formulation, implementation, evaluation and audit.

The beneficiary countries were divided into two groups: candidates (Iceland, Turkey, Croatia and Macedonia) and potential candidates (Serbia, Montenegro, Bosnia and Herzegovina, Albania and Kosovo and Metohija).

The five components of the Instrument for Pre-Accession Assistance (IPA) were:

1) Component I-Aid to transition and institution building concerned: support for EU approximation in meeting criteria and standards, strengthening institutions, participation in Community programs and in the work of agencies, etc. The requirement for the project to be approved by the EC was that the goals be consistent with the Multi-annual Indicative Planning Document (MIPD) priorities, that the project is technically correct and in line with time frames, that there is an organizational unit for the implementation of the project, etc. The program allocated EUR 4.7 billion and was a direct non-refundable EU financial grant.

2) Component II - Regional and cross-border cooperation concerned: strengthening cooperation through local and regional initiatives, sustainable economic and social development, improvement of the environment, development of entrepreneurship and tourism, facilitating regional trade, border management, improvement and implementation of laws, etc. Additional help was within the multi-annual project for each member or group

at the NUTS (Nomenclature des Unites Territoriales Statistiques) region for the period from 2007 to 2012. The EU allocated 350 million euros to candidate and potential members for membership at that time.

3) Component III-Rural Development refers to the financing of projects for technical assistance and investment works. The members received funds from the funds (ERDF, ESF and Cohesion Fund) in order to achieve three goals: convergence, regional competitiveness, employment and European territorial cooperation. From 2007 to 2012, this component could be used by Croatia, Macedonia and Turkey.

4) Component IV-related to Human Resources Development. The aim was economic and social cohesion, which was related to employment, education, training and social inclusion (only to member countries). The aid was provided in the form of guarantors and technical assistance.

5) Component V - Rural Development was intended for the development of villages in candidate countries for the implementation and management of the common agricultural policy of the EU. The preparation of the funds was used by the EAFRD - European Agricultural Fund for Rural Development. (Stojanovic et all, 2018)

IPA assistance in Serbia was initially not aimed to be long term development mechanism, but more as starting tool that will enable beneficiaries – institutions and farmers - to continue in right direction. Late start and slow process of reforms together with overall situation in the country, further weakened by global economic crisis, showed that longer assistance will be required in order to reach full harmonization with EU standards and requirements in agriculture sector (Vapa Tankosić, Stojsavljević, 2014)

Agricultural Policy of the Republic of Serbia in the European-integration Process

Agriculture is one of the promising and important industries for Serbia. In recent years, it has lost its importance, under the influence of other industries, first of all industries, and today more and more of technology and technology, science and services. The development of agriculture and the implementation of the process depend on many social and economic factors, from the achieved level of development of production forces and production relations and their influence on the state and attitude in the agrarian sector (Nikolic and Mihajlovic, 2017).

Based on previous experience of other members, one of the toughest chapters in EU accession negotiations is the chapter on agriculture and rural development. The path that Serbia must get to receive in the EU and equal membership is full of challenges and difficulties. It brings many changes related to organization, system control, production, the establishment of European standards, etc. The EU's agricultural policy is in continuous development, rather complicated and subject to constant changes. It takes a lot of time and effort, good coordination about policy alignment. CPU regulations constitute more than one-third of all EU regulations. Therefore, the chapter on agriculture should focus on priorities, ie work on the implementation of all regulations related to the association of Serbian agricultural policy with the common agricultural policy of the EU.

The Ministry of Agriculture, Forestry and Water Management (MAFWM) has the largest role in the integration and accession of agriculture of Serbia and the EU. However, due to the seriousness and scope of work, other bodies and institutions need to be involved in cooperation: the Ministry of European Integration, the Ministry of Economy and Rural Development, the Ministry of Trade and Services, the Ministry of Health, the Chamber of Commerce, Universities, etc. (Stojanovic et al., 2018).

In the past period, there has been a lot of support and assistance that the EU has implemented and donated to Serbia on its way towards alignment with CAP standards and joining a community of European nations. Some of the important donors are: Austria, Germany, Czech Republic, Japan, Switzerland, Sweden, etc. The Norwegian government has allocated a million euros to help Serbia in the framework of the project "Improving the organization of agricultural cooperatives in Serbia under the Norwegian model in 2001". The aim was to improve the business of new and existing cooperatives and agricultural associations. The Danish government's project implemented in the period from 2010 to 2014 in the south of Serbia "Implementation of the program of the economic sector for support of fruit growing and the sector of breeding of gingerbread and berry fruit in the south of Serbia" referred to the technical assistance of support of 4 million euros and donation of 5 million euro. Partnership for revitalization of rural areas, the donation of the Romanian government from 2010 to 2011, has enabled a budget of 0.2 million euros for strengthening rural social capital and promoting rural development. Serbia had EUR 1.45 million for the SAPARD program (MAFWM, 2017).

The agro-food sector and rural areas of Serbia are confronted with many challenges and problems, which reduce economic growth and development and hinder the Republic of Serbia on the path to equal membership in the EU. Therefore, for ten years, the Republic of Serbia implements the agricultural and rural development policy with the realization of: the Strategy of Agriculture and Rural Development of the Republic of Serbia for the period from 2014 to 2024, including two national programs for agriculture and rural development (MAFWE , 2014). rural development and institutions, organizations in the process of program implementation, etc. The way of functioning of the IPARD program is implemented through: the announcement of the competition and the public call, filling in the application forms, receiving and registering the project approval requests. After that, the process of acceptability of requests and users is checked (site control and administrative processing of control results). When scoring and ranking is performed, the decision and conclusion of the contract on the use of incentive funds from the IPARD program is made. (MAFWM, 2017).

It is necessary to emphasize the importance of IPARD (Instrument for Preaccession Assistance for Rural Development) program covering the period from 2014 to 2020. This is an aid instrument for rural development, achieving European standards and raising competitiveness. Serbia does not have enough competitive products (low efficiency, high costs, and unstable production conditions). Therefore, IPARD measures are trying to invest in development, in order to increase productivity. The objective of the IPARD program investment for Serbia relates to the restructuring and modernization of the agricultural food industry sector, harmonization with EU standards in food safety (veterinary, phytosanitary and ecological). The program should define support measures in accordance with current regulations, as well as the criteria and financial support frameworks, in line with EU regulations, to influence the strengthening of the LEADER approach. The structure of the program relates to SWOT, a detailed description of the measures and strategies of agriculture and rural development, the presentation of financial tables and the process of program communication, separation with national measures for rural development and institutions, organizations in the process of program implementation, etc. The way of functioning of the IPARD program is implemented through the announcement of the competition and the public call, filling in the application forms, receiving and registering the project approval requests. After that, the process of acceptability of requests and users is checked (site control and administrative processing of control results). When scoring and ranking is performed, the decision and the conclusion of the contract are made using incentive funds from the IPARD Program (MAFWE, 2017).

Serbia applied for admission to the European Union on December 22, 2009. The status of candidate for EU membership was granted to the European Council on March 1, 2012, while the decision to open accession negotiations with Serbia was made on June 28, The Republic of Serbia's EU membership talks officially began on January 21, 2014 in Brussels. For the area of agriculture, three chapters are directly related to chapter 11 (agriculture and rural development), chapter 12 (veterinary and phytosanitary policy and food safety), and

chapter 13 (fisheries). Another chapter that is indirectly related to agriculture is Chapter 27 - Environment and Chapter 28 - Consumer and Health Protection. (EU notes, 2017)

The chapter on agriculture contains a large number of binding rules, the correct application of which is essential for the functioning of the CAP. CAP implementation requires the establishment of a management and quality system such as the paying agency and the Integrated Administration and Control System, as well as capacity to implement rural development measures. Member States must be able to apply EU rules to direct aid schemes to agricultural holdings and to establish common market organizations for different agricultural projects. Furthermore, it is necessary to emphasize what changes in Serbian agriculture will be needed to adapt to the conditions and rules that exist in the common European market. When it comes to European standards in agriculture, it is mainly thought of the Good Agricultural Practices (GAP). GAPs involve the application of knowledge in the use of natural resources on sustainable principles in order to produce safe, health-safe food and other agricultural products in a human manner and with the provision of economic viability and social stability.

In simple terms, it is necessary to know, understand, plan, measure, record, control and manage the production system in order to achieve determined production and ecological goals. Good Agricultural Practices (GAP) is based on the control of critical points (H.A.C.C.P.) and the quality of products given under the Codex Alimentarius Code of Practice of the World Health Organization. The World Food and Agriculture Organization (FAO) Good Agricultural Initiative (FAO) initiative provides a mechanism for the implementation of specific activities that enable sustainable agriculture and rural development. The methodology of good agricultural practice refers to specific production problems such as, for example, the use of integral protection methods and sustainable agriculture. Adherence to these standards should have a direct consequence of increasing the competitiveness of Serbian agriculture. However, in order for these standards to be truly accepted and practically implemented, there will be a need for a change in domestic legislation, the consistent application of adopted laws (which is currently not the case in Serbia), and most importantly - education and change of awareness of all those directly or indirectly involved in agricultural production.

According to Serbia progress report, Serbia has some level of preparation in agriculture and rural development. Good progress was made by achieving entrustment with budget implementation tasks for all the measures included in the IPARD II Programme and amending the law on agriculture and rural development. In the coming period, Serbia should in particular: implement the measures entrusted under the IPARD II programme and seek entrustment with budget implementation tasks for other measures of the programme; finalize and proceed with implementation of the action plan for acquis alignment in agriculture and rural development. As regards horizontal issues, the action plan for acquis alignment in agriculture and rural development still needs to be adopted. The National Program for Agriculture for the period 2018-2020 was adopted in 2017 while the program for rural development still needs to be adopted. A fully functional IPARD agency was established. The amendment to the law on agriculture and rural

development established the legal basis for IPARD and also for the future Integrated Administration and Control System (IACS), which is yet to be developed. Further alignment with EU policies requires decoupling of payments from production and linkage of area based payments to cross-compliance standards. The Farm Accountancy Data Network (FADN) is established, formal institutional responsibilities designated, and aligning legislation has been adopted. Serbia has a farm advisory system in place. In the area of the common market organization (CMO), a number of implementing legal acts aiming at further alignment in the wine sector were adopted. Serbia should take steps towards aligning with the other elements of the CMO, including sector specific schemes, marketing standards, support for public and private storage, marketing and producer organizations, market intervention. On rural development, Serbia has taken a significant step forward in being entrusted by the European Commission with budget implementation tasks for two investment measures under the IPARD II Programme. Serbia should focus on spending EU funds while, at the same time, prepare remaining IPARD measures for implementation in 2018. Progress is slow in the area of quality policy. Legislation in the area of agricultural products and foodstuffs needs to be aligned to facilitate policy development in this field. Legislation pertaining to quality wine products also needs to be fully aligned with the acquis. As regards organic farming, Serbia has established a competent authority for organic production, a system of accreditation of control bodies and a system of certification of organic production. Further alignment with the acquis on organic production is however needed. A national action plan for the development of the organic sector has yet to be adopted. (Serbia progress Report, 2018)

Conclusions

The CAP provides: access to safe and stable quality food products produced in a way to protect the environment and wildlife, maintaining the rural community alive with raising the quality of life, ensuring the same conditions for farmers in all member states, fighting the global economic crisis, combating climate change, preservation of cultural heritage, achievement and maintenance of self-sufficiency in food. CAP is a consequence of a single economic area and guarantees fair trade, defense of farmers from traffickers, speculators and imported importers, must respect the high standard of the EU, the complete ban on the import of genetically modified products.

All modern challenges to agricultural development require effective measures of agricultural policy (Ristić, Milijić & Durkalić).The most important reason why agriculture in the EU is more developed and why they are farmers in European countries in a better position than domestic ones, there is the existence of quality communication and cooperation with state institutions. In order to achieve this, it is necessary for agricultural producers to be integrated, that is, to respect the standards of association and cooperation. On the other hand, state institutions should respect good governance standards. Also, sustainability agricultural principles require changes in the way of thinking and values, where the changes must include global interdependence, life environment management, social responsibility and economic sustainability (Kostić, Lakićević & Milićević).

The Serbian agriculture sector in the past decades, after all the negative challenges that it faced in the past, experienced a serious economic downturn and economic crisis. Recovery of Serbian agriculture and rural development, economic growth and competitiveness of agricultural products, improvement of standards and preservation of the environment, are possible only with the integration and implementation of CPU regulations. In recent years, Serbia has embarked on systemic and structural reforms of the agrarian sector. It has adopted a strategy for agriculture and rural development. It has begun to integrate CAP and harmonize with EU legislation through the financial donation of various funds and programs (SAPARD, IPA, IPARD, etc.). However, it is still confronted with many problems and challenges that undermine agricultural recovery, economic growth and development. There is no doubt that it is one of the most difficult chapters in the EU accession negotiations, it is the chapter of agriculture. The chapter requires a lot of effort, good organization and priority in implementation and harmonization, since more than one-third of all the regulations for accession are precisely from this sector. Bearing in mind the weight and conformity of the CAP and the integration process, as well as the unfavorable situation of the Serbian agrarian sector, a great responsibility is evident in the standardization and acceleration of the process on the path to equal EU membership

In the past period, Serbia started structural reforms of agrarian policy by implementing various strategies and programs and made significant steps. The harmonization of the standardization of the common agricultural policy and agricultural policy of Serbia is not only a condition for membership in the EU. Its application would result in increased production, improved product quality, market competitiveness, increased imports and exports, modernization of equipment and introduction of new technologies, etc. Consequently, there would be an improvement in the socio-economic life, an increase in the standard of the population, the development of the rural environment and the recovery of the country and the Serbian economy as a whole. Various investments and donations have given hope to a Serbian farmer to stay in the countryside and develop his farm and production, nurturing the EU standard and preserving its environment and environment.

Conflict of interests

The authors declare no conflict of interest.

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Table 1. 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

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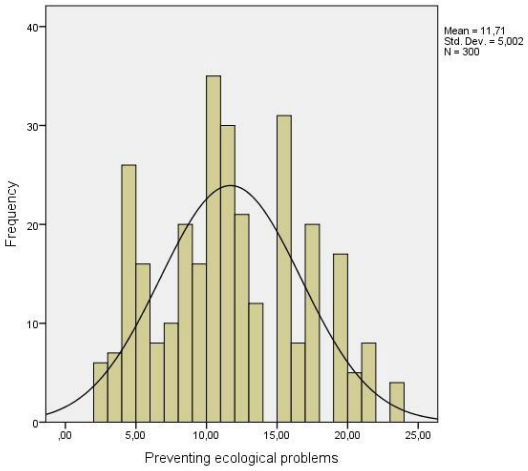
Figure 1. Agriculture, value added (% of GDP)



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