
INNOVATIVE FOOD PRODUCTS AS A BASIS FOR THE DEVELOPMENT OF RURAL TOURISM IN VOJVODINA

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ABSTRACT

The subject of the review article is the development of rural tourism based on innovative food products. The aim of this paper is to identify key forms of rural entrepreneurial tourism in Vojvodina. Gastronomy plays a significant role in presenting the culture and way of life of a certain area and reflects new trends in tourism-related to authenticity, sustainability, healthy lifestyle, and revival of tradition. The development of rural tourism should be based on efficient investment in the tourist offer through entrepreneurial projects that are in line with modern demand trends, including the production of food products that are gradually appearing on the market. Investing in the tourist offer in rural tourist destinations would affect the growth of income from rural tourism, and thus the economic development of rural areas and the state itself.

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Introduction

The goal of the tourist industry is to make conditions to attract tourists and to meet their requirements. It is a very dynamic phenomenon that should constantly adapt to changes that are a result of the potential tourists' requirements (Williams, 2020; Zdravković & Peković, 2020).

The countries of the Western Balkans have become recognizable in Europe as a very suitable area for the development of rural tourism. The development of rural tourism is based on the interaction of food producers and the tourist offer of that geographical

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area, and food is one of the most important tourist offers. Tourist national products as strategic products and tourist consumption, which leads every country and its economy from poverty to the welfare world (Marković & Pidžo, 2020). The gastronomic offer is preconditioned for the development of rural tourism. Healthy national food is the driving force of health tourism. Interactivity between the tourism industry and agriculture, the food industry, as well as other industries and activities is a very important factor in the relationship with modern tourists.

Given the fact that Vojvodina is extremely rich in cereals and recognizable as the granary of Europe, this part of Serbia has very good potential for the development of rural tourism. The multiple importance of both social and economic and proper approach and understanding of rural development in the municipality has shown good results. In essence, the perspective of dealing with this type of tourism by the local self-government and rural hosts was determined on time, and the policy and importance of rural areas within the market economy system were determined (Banjac et al., 2016). An integrated approach to development implies a process on which decisions and perceptions of the social, spatial (including natural aspect), economic and technological aspects of development are based, but not as a simple set of knowledge, but as a means of optimizing relationships to preserve natural values. Modern trends in the world market require such spaces of original or minimally changed environment and our possibilities on the picky market can be destinations with undisturbed ambient units of rural areas, where rural settlements, traditional manifestations, and gastronomic specifics (Milićević et al., 2015). The reintegration of tourism on the world market and the reaffirmation of Serbia as a destination, as a priority task, imposes the need for more efficient incorporation of the ecological component into the tourist product, which wins a more favorable market position, greater competitiveness and profitability. However, the purpose of functional food will be that of sustainable agricultural development promotion (Sidali et al., 2015).

Rural tourism is a combination of many different aspects of the experience, sharing and presenting rural life. These rural experience can be defined in terms of rural activities and experiences found (Sharpley & Jepson, 2011). The combination of these forms is the essence of rural tourism. Analysis of rural tourism in Serbia shown in Table 1.

Table 1. Analysis of rural tourism in Serbia

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Great natural potential for the development of rural tourism • The recognizable and preserved tradition of the Serbian people • The ecologically preserved area with natural resources 	<ul style="list-style-type: none"> • Underdeveloped entrepreneurship and business in rural areas • Poor infrastructure • Lack of educated staff that would create modern directions for tourism development • Poor promotion by the locals • Poor employment
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Preservation of natural resources • Entrepreneurship development • Encouraging the return of the population to rural areas • Development of local tourism companies 	<ul style="list-style-type: none"> • Consumer requirements are changing in line with new and modern trends • Strong competition in the domestic and foreign markets • Slower infrastructure development • Slower financial support for the development of agricultural goods and services

Source: Maksimović et al., 2015

There are still no precise data on the number of tourists interested in rural tourism, but the assumptions of world tourism organizations show that 75% of the world's population shows interest in nature vacations.

Tourists are interested in:

active vacation in a natural and ecologically preserved area

traditional, cultural, and historical values of the place where they have a rest

accommodation adapted to their requirements, different styles, basically wood as a material and facilities adapted for rest and recreation (Maksimović et al., 2015).

The importance of nutrition has changed significantly in modern society. Consumer demands when it comes to food products have been increasing in the last ten years.

Natural landscapes mountains, rivers, tradition, culture and a healthy lifestyle are just some of the requirements of tourists for their stay in a rural area. Local food is an unavoidable segment of the tourist offer, which is why more and more attention is paid to the improvement of local gastronomy. The gastronomic offer is the basis for attracting tourists, with the idea to respond to the demands of tourists, to follow modern trends, and to remain authentic and unique (Grigorova et al., 2015).

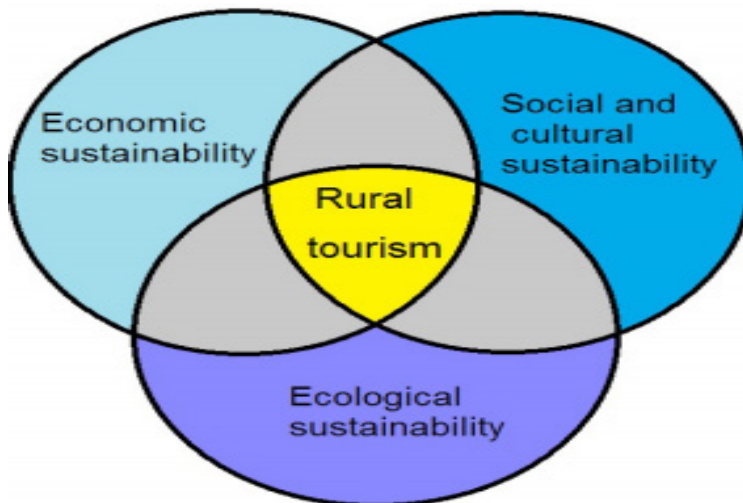
On this basis, food tourism is a rapidly growing sector and rural areas can use it as a Therefore, the development of tourism in rural areas conditions the development of the

food industry and gastronomic offer, which together represent a means of economic diversification. In this way, an opportunity is created to create new food products that will contribute to the marketing and economic security of rural areas (Hall, et. al., 2004).

In recent years, significant developments in research in food science are more focused on the fabrication of different new food products based on the beneficial effect on the human organism. Novel food products are important because of their quality, nutritional value, because of applying modern technologies to obtaining potential new food products. Functional food or food with added value with special plant ingredients presently serves as a systematic paradigm. This evolution is focused on improving human health and also providing protection from various diseases (Molina et al., 2012). With the advent of the coronavirus, people have become more focused on living in rural areas, the traditional way of food production, and the development of rural tourism. In this way, a new era and a turn in the interests of modern society begins. Functional food utilizes technologies and policies for inclusive development, presenting a high range of nutritional and health benefits. It is good for the planet, the consumer, the farmer, and is environmentally sustainable. Functional foods in its composition include berry fruits and medicinal plants, cereals as well as all foods that can be eaten as staples. Diversifying these staples can lead to a drastic reduction in malnutrition and the maximization of overall benefits (Fanelli, 2020).

Smallholder agricultural production plays a major role in food and nutrition security in many developing countries. The very vision of sustainable rural tourism is a balance of economic sustainability, social and cultural sustainability and environmental sustainability, as shown in Figure 1.

Figure 1. The vision of sustainable rural tourism



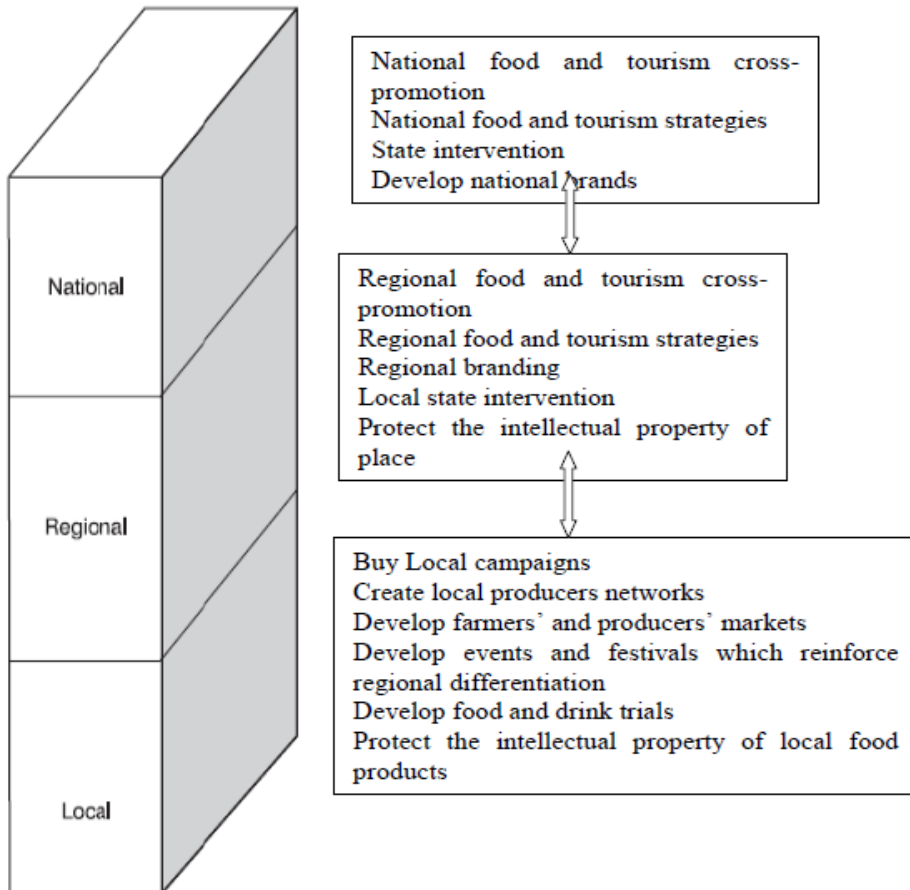
Source: Maksimović et al., 2015

An increase in the consumption of fruits and vegetables is associated with a decrease in the incidence of cardiovascular disease and reduced risks of certain cancers. It is important to bear in mind that not all vegetables have the same composition and antioxidant capacity (Dey et al., 2016). It is therefore important to recognize which vegetables have the highest antioxidant capacity and introduce them regularly into the diet (Pereira et al., 2016).

Vojvodina is famous for its rich diversity in terms of traditions, culture, history, art, and food. The rich culture and traditions of Vojvodina are reflected in its cuisine that encompasses a wide range of delicacies enriching the palate with a plethora of aroma and taste (Dragičević et al., 2012). The food is different in terms of taste, variety, and style of cooking; be it south, central east, or west Serbia, each part has its own distinct quality, yet woven together with the common thread of spices and mouth-watering flavors. The difficult terrain acts as a fortress safeguarding the state's culture and traditions from external influences, and one can still witness the prevalence of age-old traditions in the rural pockets of the state during its fairs, festivals, and social ceremonies (Tanwar et al., 2018). The promotion of 'valorization' of culinary heritage encourages independent and collective initiatives and is seen as a process by which local action and appropriation cater for the development of rural tourism. The term novel food refers to food that is not part of the traditional eating habits of European citizens (Sharma et al., 2018). Novel food products are foods with different characteristics in various respects and, in this context, they are a contrast to traditional food. These foods are an expression of integration of the different food cultures, so novel food is an innovative food or food produced using new technologies and new production processes. It follows that novel foods are innovative products that require a different production process from the standard EU one or derived from the application of innovative bio technologies (Garau, 2015). Innovation is undoubtedly a starting point for economic progress and development. In some studies, it has been shown that the new technology investments have brought high productivity rates and rapid, positive economic growth, by demonstrating a significant effect on economic growth (Dubé et al., 2014).

Villages in Serbia are places to engage in various forms of alternative tourism that include sports activities in nature, culinary, ecological, wine, cultural tourism. The existence of alternative forms of tourism is of great importance for attracting tourists because their requirements can be fully realized through a stay in rural areas. Relationship between national, regional and local food, tourism and regional development was shown on Figure 2.

Figure 2. Relationship between national, regional and local food, tourism and regional development



Source: Hall, et al., 2005

A key prerequisite for the development of rural tourism is the authentic character of the products. Therefore rural and food tourism have their basis for networking.

Innovative food products

Fruit juices

The greater presence of plant fruits in the human diet has influenced the beverage industry to favor the production of functional products, especially juices, as fresh beverages. Fruit juices are rich in nutritional components and have no allergens. This type of juice represents a taste profile that is considered pleasant for all age groups, perceived as a healthy and refreshing drink, and consumed regularly. Some natural juices have high acidity, can naturally contain microbial growth inhibitors, and can be added to food products (colors and flavors). The aroma of fresh juice is due to the

complex composition of volatile compounds, as well as the presence of polyphenolic components (Zanini et al., 2016).

The content of compounds that give a characteristic odor to juices varies depending on maturity, as well as the applied fruit processing techniques.

The smell of freshly squeezed juice is noticeably different from heat-treated juices because during processing there is a loss of aromatic compounds or unpleasant odors during heating and storage of products, which adversely affects the placement of juice because consumer expectations are not met.

That is why some producers have encouraged the production of freshly squeezed juices without additives, sugar, water and claim that they contain more nutritional components and that they can be stored longer than the juices obtained in juicers. This claim is based on the fact that in centrifugal juicers, fruit fruits are crushed with a metal blade and the use of centrifugal force, as a result of which the juice extract is separated from the fruit flesh (pulp). The metal blade rotates at high speed, during which heat develops which negatively affects the content of bioactive components in the juice. In contrast, traditionally freshly squeezed juices are obtained by manual crushing of the fruit and pressing of the crushed fruit from which the juice is released. During manual squeezing of juice, no heat is released and the nutritional composition of the juice is preserved, which justifies the market price of hand-squeezed juices, which is higher than the price of conventional ones (Ozen and Singh, 2020).

The influence of temperature and time period of juice storage are important parameters related to the quality of this product. In a study conducted by Khaksar et al. (2019) it was determined that freshly squeezed juices that are not pasteurized and in which there are no additives are stable at a temperature of 4 ° C for 5 days, ie that they do not lose their nutritional value.

Economic analyzes indicate increased industrial production of fruit juices, including the possibility of using wild plants that are widespread and easily available. The untouched rural areas of the Balkan countries are rich in this phytochemically valuable plant species, whose biopotential is discussed throughout the history of human civilization. In order to obtain new products that could meet the expectations of a functional product and meet the standards of rural tourism, most often resort to domestic production of berry juices specific to a particular region, such as chokeberry, blueberry, strawberry, blackberry, raspberry, and others berry fruits (Vicentini et al., 2016).

Fruit wines

The term wine mainly refers to grape wine, however, different cultures in the world use other raw materials in the process of wine production. The history of fruit wines is not as long and prestigious as the history of grape wines. Research dedicated to fruit wines is taking an increasing position in scientific studies, in the form of commercial opportunities and health benefits that fruit wines have (Rupasinghe et al., 2017). Fruit

wines are obtained according to the technological procedure used to obtain wine from grapes in the process of alcoholic fermentation of fruit juice (Figure 2.9) (McKay et al., 2015). Any type of berry can be used as a raw material for fruit wines (Thilakarathna & Rupsasinghe, 2013). During wine production, it is possible to apply various treatments, such as heat treatment due to the more efficient isolation of cellular ingredients. The influence of temperature increases the content of the liquid phase and makes it easier to isolate the compounds that give the wine its characteristic color (Sokolowsky et al., 2015). However, the temperature also leads to the degradation of thermolabile components, through a series of reactions it accelerates the formation of aromatic complexes that give the wine “smell and taste when cooked”.

There are fruit wines from crops on the market that are mainly grown in plantations (blueberries, blackberries, raspberries, strawberries, and other berries), while wine from some types of wild crops is still not recognized and available as a commercial product. Wine tourism gives hope for survival and investment in rural areas. The impact of wine and wine components on human health has been known since ancient times, and the benefits of fruit wines are presented below.

The chemical composition of fruit wines is complex and the main ingredients are water, alcohol, sugars, organic acids, minerals, but also polyphenolic compounds, higher alcohols, esters, and other components (Johnson and Gonzalez de Mejia, 2012). Volatile and non-volatile acids, esters, higher alcohols, aldehydes, and ketones greatly contribute to the final sensory character of the product.

The amount of alcohol as one of the main ingredients in wine depends on the applied technology in wine production and usually ranges between 5 and 15%. The degree of ripeness of the fruit affects the sugar content, which also refers to the level of alcohol. If the fruit is not of the appropriate degree of ripeness, it is necessary to add sugar during fermentation, which can define the final sweetness of the wine. The amount of ethanol is important for the stability and sensory properties of the wine. During fermentation, the increase in alcohol content significantly limits the growth of yeast. Also, the presence of alcohol is important from the aspect of discussing the bioavailability of wine ingredients with potential health benefits. In addition to ethanol, methanol is also present in fruit wines, which is toxic to humans. Based on legal regulations, the content of methanol in commercial red wines must not exceed 300 mg/L (Official Gazette of RS No. 26/2015).

The sugar content is important for the growth and metabolism of yeasts because wine yeasts get most of their metabolic energy from the catabolism of glucose and fructose (Jackson, 2008). The main disadvantage of fruit wines is the lower sugar content, compared to grape wine. The dominant sugars in berries are glucose and fructose, with different contents depending on the plant species to which they belong (Milivojević et al., 2011; Mikulic-Petkovsek et al., 2012). The total sugar content in berries is slightly lower than the sugar content in grapes, which is why it is desirable to add water during the production of berry wine. The added water reduces the acidity of the berry stalk, but adversely affects the sensory characteristics of the wine.

The composition of organic acids in berry wine comes from their content in fruits. The most common organic acids that are present in berries are citric, malic, vinegar, tartaric, and fumaric, and their content varies depending on the type and stage of fruit ripeness (Milivojevic et al., 2012). The presence of organic acids in fruit wines is also affected by yeast because yeast produces them during fermentation (Duarte et al., 2010). The content of volatile acids, specifically acetic acid, must be maintained at a minimum level because their presence in a concentration above 1.2 g/L could develop an unwanted aroma (Swiegers & Pretorius, 2005).

Wine also contains a significant amount of minerals in easily accessible forms, especially K and Fe, which classifies wine as an important food product. K is the dominant mineral in fruit wines, followed by Ca, S, P, and Mg and small amounts of Na. Excessive consumption of wine, due to the presence of alcohol, can disrupt the intake of Ca, Mg, Se, and Zn and increase the excretion of Zn by the kidneys (Rupasinghe & Clegg, 2007). Excessive alcohol intake negatively affects the absorption, metabolism, and excretion, due to which there is a disturbance of the homeostasis of microelements that are necessary for the proper development of biochemical processes in the body.

All these benefits provided by berries and medicinal plant raw materials that grow in rural areas of Vojvodina represent an exceptional natural potential for the development of rural tourism. The production of mother juices and fruit wines could be the first step towards better development of this type of tourism because gastronomic products of traditional producers that are slowly appearing on the market are increasingly attracting the attention of tourists.

Also, it is important to note that in this case, too, the economic aspect is extremely important, because investing in production provides the development of areas that have been largely forgotten by modern society (Gunasekaran et al., 2004).

Application of modern and traditional technologies for obtaining new products in order to develop rural tourism

Basic engineering concepts related to culinary processes, especially to heat transfer mechanisms, which are represented in the food industry. It is assumed that a lot of knowledge from process engineering could be applied in gastronomy in order to improve product quality by applying innovative technologies (Trystam, 2013).

Solid-liquid extraction is a technological process used in the food industry in order to isolate bioactive molecules from certain food ingredients (Tzia & Liakadis, 2003). In addition to isolating food ingredients, extractions could be used to obtain plant-based extracts used in gastronomy with the aim of improving the taste and quality of food. The isolation of aromatic molecules from plants, their purification, and their addition to already existing products affect the improvement of sensory and functional characteristics of traditional products. In addition to extraction, centrifugation is also a technological process used in cooking, which indicates that multidisciplinary is the starting point for the development of new quality products (This, 2014).

Lyophilization is also a technological drying process that involves removing water from the material being dried. The lyophilization process is also known as dehydration and takes place in a vacuum with strict control of critical temperature and pressure parameters. By applying this drying technology in the food industry, high-quality food is obtained, with low water content, and a preserved aroma and authentic taste. Lyophilized products have the ability to rehydrate, and can be consumed as dried products with a very fine and preserved texture (King, 1971). This modern drying process is a very complex technology that requires the engagement of engineers, food technologists who will regulate the process to ensure the production of quality products competitive on the market (Peñarrieta et al., 2012). Obtaining products with low water content in the food industry has initiated the commercialization of lyophilization, so it is also used to create products intended for astronauts (Loss & Bouzari, 2016; Valentina et al., 2016). In addition, lyophilization is also used to make confectionery products such as ice cream, creams, and chocolates (Carvalho et al., 2017). The application of technological processes of extraction and lyophilization in gastronomy is of great importance for the creation of new products. The development of rural tourism can best take place through multidisciplinary, ie by connecting gastronomy, technology, medicine, and economy. By changing people's consciousness, attitudes towards villages are also changing, not only in Serbia but also in European countries, which brings rural tourism into the focus of interest of potential investors.

Conclusions

The natural potential and wealth of Vojvodina are the starting point for investments and development of rural tourism. Active vacation, religious tourism, wine tourism, local culture, traditional customs, and gastronomic offer make the rural area recognizable and attractive to visit. Greater emphasis on the gastronomic offer implies the use of traditional natural raw materials for obtaining new food products. The development of gastronomy and tourism is directly related to the health of the population and the country's economy, which is what modern society strives for. Governments and ministries are not directly involved in rural development, their discourses often take a strategic direction at the local level. However, the government's desire to work on popularizing rural areas and attracting potential investors leads to the sustainable development of local government projects related to the ecological environment. However, their initiatives can influence the final decisions of investors regarding the practical application of rural development.

Conflict of interests

The authors declare no conflict of interest.

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