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ENHANCING AGRI-COMPETITIVENESS: A COST-BENEFIT ANALYSIS OF RASPBERRY PRODUCTION ON A FAMILY FARM

Povećanje agrokonkurentnosti – cost-benefit analiza proizvodnje maline na porodičnom gazdinstvu

Abstract

The research presented in this paper shows the efficiency of resource utilization on small family farms, where business activities are highly dependent on natural factors. The production process is mainly labor-intensive, while investments in fixed assets are frequently hindered by difficulties in securing finance. Serbia has not used its high potentials to a sufficient extent owing to the inadequate application of agronomic measures.

The impetus for the production of high-quality grade one raspberries, which command the highest price, leads to an increase of yield from 7t/ha to 13t/ha as a result of the application of adequate agronomic measures.

The goal is to grow sufficient quantities of high-quality raspberries.

Keywords: *family farm, raspberry, production, competitiveness*

Sažetak

Istraživanje u ovom radu prikazuje efikasnost iskorišćavanja resursa u malim porodičnim gazdinstvima. Poslovne aktivnosti su visoko zavisne od prirodnih faktora. Proces proizvodnje je uglavnom radno-intenzivan, dok su ulaganja u osnovna sredstva često otežana usled otežanih uslova finansiranja. Velike potencijale Srbija nije dovoljno iskoristila zbog neadekvatne primene agrotehničkih mera.

Stimulans za proizvodnju kvalitetne maline prve klase, čija je cena najpovoljnija, dovodi do povećane proizvodnje sa 7t/h na 13t/h zbog primene adekvatnih agrotehničkih mera.

Cilj je proizvoditi dovoljne količine visokokvalitetne maline.

Ključne reči: *porodično gazdinstvo, malina, proizvodnja, konkurentnost*

Introduction

Consumers' demands for high-quality products impose the requirement for well-coordinated production and consumption. Future considerations should focus on the marketing concept, as it is becoming a factor in increasingly wide vertical and horizontal cooperation between growers and traders. Organizations need to address the challenges of speed, convenience and reliability. This can help reduce costs, increase productivity and reduce risk, thus achieving competitive advantage, as concluded by Walker et al. [14]. The suboptimal production structure in Serbia is another hindrance to competitiveness. The problem of small family farms in the transition period is well-known in development policy as a crucial problem in the country. The process of transforming these family farms into market-oriented farms with sustainable potential should be supported through special measures, accession and transition assistance programs (SAPARD and IPARD).

In Serbia, small family farms with modest development potential comprise the majority of all family farms. These farms are at a high income risk owing to the increasing competition on the domestic market and limited opportunities for employment and generation of external income. The key risks to further agri-product marketing are inefficient production practices. Consistent policies on efficient marketing channels at the macro and micro levels, as well as the supply-demand balance, are matters to be researched further according to Revoredo-Giha & Leat [10].

The complexity of marketing channels is also reflected in the complexity of performance measurement across the supply chain as proved by Aramyan et al. [2].

Local marketing channels insist on shorter distances from producers to consumers, thus contributing to the overall development by increasing local farmers' earnings, enhancing the rural economy and the overall utility to consumers who, in the globalization era, prefer locally sourced food [3], [6], [7].

The integration of family farm marketing channel members

The family-based farming model is a problem faced by all countries, given that its form has never been ideal anywhere. The agri-industrial business and family farms are increasingly inextricably linked. The family-based farming model is inevitably becoming integrated in agri-industrial business developments, which implies the increasing employment of capital in food production. Risks, such as production, institutional or price risks, are being overcome through the pooling of smaller producers. Competitiveness and higher market share are achieved by producers' pooling into larger groups in order to ensure an enhanced marketing approach and respond to the demands of the contemporary market, or marketing activity management models. This trend is evidenced by an analysis of the family farm of Mr. Ljubinko Tomić, based in Užice, who is a member of the marketing channel of a complex agribusiness system operated by the company Yugent Food (see Tables 3, 4).

Table 1: Characteristics of the family-based farming model

Traditionally oriented farmers	Entrepreneurially oriented farmers
Usually small farm and cautious expansion	Markedly large farm
Caution when incurring debt	Extensive capital borrowing
Higher stability in difficult times	Risk of over-indebtedness
Preference for land ownership over lease	Land lease and ownership equally desirable
Production diversification	Specialized and commercialized production
Lower sensitivity to market shocks	High sensitivity to market shocks
Continuity of family identity on the farm	Farm is not the family's permanent base
Higher level of intergenerational cooperation in the household	Intergenerational competition on the farm
Farm preserved for one heir	Self-establishment of a possible successor to pursue the parents' occupation
High level of loyalty and environmentally-friendly behavior	Lower level of loyalty to the community and profit orientation

Source: [15].

Only strong agri-industrial business and food industry can be economically attractive business partners to a small family farm. Through integration, small producers obtain secure access to the market, as well as to new technologies and knowledge needed to improve their production. Within the company Yugent Food, taken as an example of an agribusiness system, a department for cooperation with individual family farms has been established. Shared interests have been identified with 851 farms. Producers are offered fertilizers and plant protection products used in raspberry production. This business relationship is in the interest of both partners, as it is based on mutual trust and strong ties, while the opportunities presented by such cooperation are virtually inexhaustible.

In a new agrarian strategy, an individual family farm should be the pivot of future development (see Table 1).

Economically sound development is the only path to be pursued by small family farms. Fierce market competition requires strong and capable businesses. A family farm as a stand-alone unit is not capable of approaching the market on its own.

The contemporary business environment requires prompt responses by businesses. Importers must also export in order to secure foreign currency for further purchases. Both large and small farms must adapt by building economic ties, thereby improving their operations. In Serbia, priority was formerly given to large agri-industrial enterprises, owing to their higher productivity and efficiency. Using the example of small producers tied to the company Yugent Food, we will demonstrate that small family farms are capable of becoming vibrant specialized producers. The trust that forms the basis for the cooperation between small family farms and the company will contribute to increased commodity production. At present, the major problems include financing current production. The pricing policy requires review and modification. To date, it has been discriminatory and based on rigorous price control. Managers who build teams ready for cooperation and entrepreneurship will be able to adapt to the environment and market conditions.

The potential for raspberry production on family farms – a cost-benefit analysis

Raspberries are among the key export products and constitute the backbone of rural development in certain areas. Serbia is one of the world's leading raspberry producers and accounts for about one quarter of the global output. An analysis of export and consumption reveals a trend of production stagnation from year to year, accompanied by price growth. The conclusion is that, owing to insufficient raspberry production volume, prices are growing, resulting in an inability to increase raspberry sales for human consumption for economic reasons. In addition to the insufficient production volume, the focus should be on the modalities of raspberry production, purchase and marketing.

The overview shown in Table 2 gives rise to the conclusion that, despite the tendency toward increasing plantation areas and the number of fruit-bearing stems, the yield mainly remains unchanged or declines. This indicates Serbia's high potentials, as yet underutilized owing to the inadequate application of agronomic measures. Export stagnation is also caused by the insufficient quantities produced.

The research data based on analysis of a specific family farm indicate the possibility of increasing the yield per hectare (see Table 5). The core business activity of the observed farm is livestock farming, more specifically sheep rearing. Its ancillary activity, fruit production, comprises plum and raspberry production. Sheep and lambs are sold through brokers and to natural persons. 99% of the raspberry output is sold to the cold store operator Yugent Food. The farm retains about 1% of its livestock and fruit output for subsistence consumption and craft food production. Its development vision for the 2012–2017

Table 2: Raspberry yield in the 2003-2012 period

Crop year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Yield per ha, in t	4.8	5.7	5.5	5.3	5.3	5.7	5.8	5.5	5.8	4.5
Plantation area, in ha	16,354	15,995	15,413	15,024	14,496	14,680	14,957	15,171	15,354	15,748

Source: The author's adaptations based on [12].

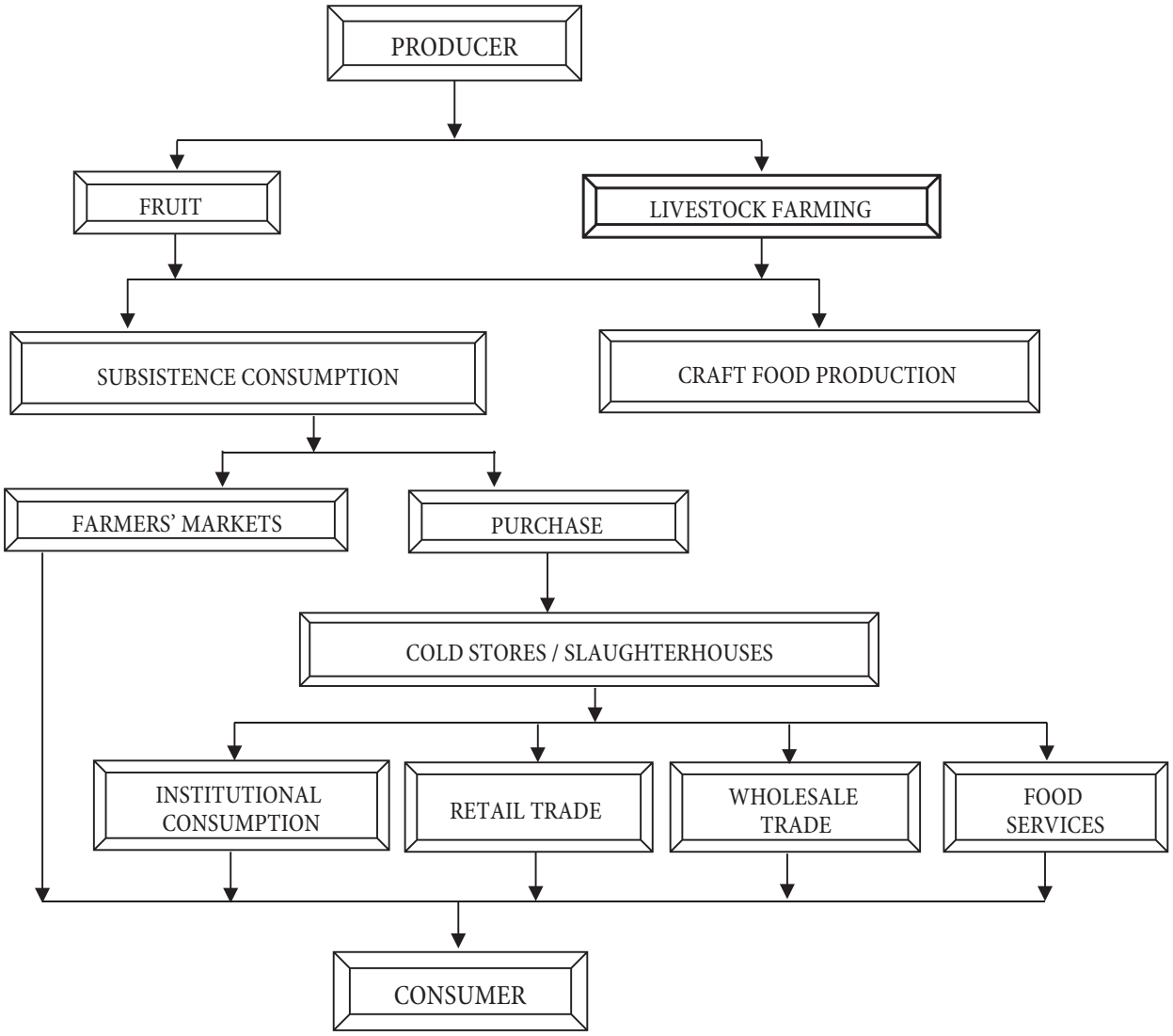
period is to increase the sheep headcount by 11. As its greatest weakness, the farm highlights the lack of its own funds and labor force within the household. Unfavorable location is another hindrance to the farm's operation. The government's and its agencies' unconducive attitude to farm growth and development is a major threat.

The farm sees its environment-friendly products and their price competitiveness as a strength in its further development. Owing to the well-organized marketing channel, the enterprise sees great export possibilities as an opportunity for further farm growth and development. The farm has identified the need for certification (EUROGAP); however, the cost of maintaining the certificate is too high. The farm's machinery is obsolete. Small machines are used due to the terrain features (hilly and mountainous area). The farm has a passenger vehicle and one tractor.

Sales of the farm's outputs takes place without difficulties. Raspberries account for 84% and lambs for 16% of the total planned farm revenue in 2016. Plums are used only for on-farm subsistence consumption. The planned sale's revenue in 2016 amounts to EUR 10,500 for raspberries, and EUR 2,100 for lambs. The goods are sold at market prices, and the introduction of additional products is not planned.

The business goal is to generate revenue exceeding labor costs. Revenue depends on raspberry price in the global market, as well as on increased yield per hectare. If yield per hectare increases, costs decrease. In raspberry

Figure 1: The selected family farm's marketing channel



Source: The author's adaptations based on [9].

production, success is achieved by reducing the plantation area and maximizing the output on the existing areas under crops, as this facilitates savings in labor costs for plantation maintenance and operation.

The farm has 80 ares of arable land under raspberries. The cost-effectiveness of raspberry production will be shown by a cost-benefit analysis (see Tables 3, 4). The method employed is net present value (NPV). The profitability of the investment in raspberry production will be indicated by the positive or negative NPV.

Table 3: Raspberry sale revenue on the selected farm in 2013

Crop	Quantity sold, kg/are	Plantation area (ares)	Total quantity sold (kg)	Farm gate price of Willamette raspberries, EUR/kg	Total sale revenue (EUR)
Raspberry	69	80	5,520	1.75	9,660

Source: [9].

Table 4: Raspberry production costs on the selected farm in 2013

Type of cost	Plantation area 80 ares, in EUR
Annual maintenance and harvest costs, 80 ares	3,780
Annual plantation depreciation cost, 80 ares	420
Total quantity produced, kg/are	70
Total annual cost, 80 ares	4,200
Unit cost, EUR/kg	0.75
Cost of raspberries sold	4,140

Source: [9].

The benefits derived from the investment in raspberry production are calculated by means of the following formula:

$$NPV = \sum_{n=1}^{12} \frac{B_n - C_n}{(1+r)^n}$$

where

C_n – expected raspberry production costs,

B_n – expected raspberry sale revenue,

r – interest rate.

The analysis considers a period of 12 years, assuming that activities are carried out without major oscillations. The useful life of a raspberry plantation is 15 years. The full yield potential is achieved in the third year after the plantation is set up; hence, the period under consideration is 12 years. More specifically, after 12 years, the family farm concerned will need to replace the entire plantation. The data from Tables 3 and 4 will be used. Rate r, whose level depends on the subjective assessment of the future net benefit, will stand at 8% [4, p. 198].

By inputting our data in the net present value formula, where the expected raspberry production costs amount to EUR 4,140, and the expected revenue to EUR 9,660, we come to the net present value of EUR 5,111 in the first year of raspberry sale, while the costs-to-revenue ratio stands at 2.3, which is higher than zero, thus demonstrating that raspberry production in future years is profitable (see Tables 3, 4). A risk may lie in market saturation resulting from raspberry hyperproduction, and failure to meet the EU standards. If an attempt is to be made to reduce future raspberry marketing risks, then the production process should be enhanced and adequate soil supplementation and chemical protection should be applied, as this would safeguard raspberry producers' market interests. Increasing yield per hectare reduces raspberry production costs, as yield stands in an inverse relationship to costs (see Table 5).

The calculation based on the agri-environmental conditions present in Western Serbia for the Willamette variety, assuming planned budgeting and agronomic measures are properly applied, differs dramatically from the calculation based on the Serbian family farms' agricultural practices. It can be presented as follows:

Table 5: Calculation of annual costs for the agri-environmental conditions concerned

Type of cost	Plantation area 80 ares, in EUR
Annual maintenance and harvest costs, 80 ares	7,960
Annual plantation depreciation cost, 80 ares	747
Total annual cost, 80 ares	8,707
Unit cost, EUR/kg	1.09
Quantity of raspberries produced, kg/are	100
Quantity of raspberries sold, kg/are	99
Total cost of raspberries sold, EUR	8,633
Total revenue from raspberries sold, 80 ares	13,702

Source: [9].

The data presented above lead to the conclusion that the cost per kilogram is higher by 0.34 EUR/kg. The cost increases as a result of additional investments in the production process, which results in raspberry yield increase from 70 kg/are to 100 kg/are. Owing to the higher produce quality, a higher price is accomplished in the global market and the sale is secured. Therefore, the total

revenue stated in Table 5, showing the calculation for the relevant agri-environmental conditions, will be higher.

Agri-competitiveness and cooperation among raspberry marketing channel members

In Serbia, raspberries are processed in industrial facilities and on farms, with the processing industry development level being very low. Raspberries are mainly processed in cold stores to produce semi-finished products, which are subsequently exported for further processing.

In rural areas, agricultural operations are predominantly of an extensive character and, from the aspect of income generation, subsistence-oriented, primarily aimed at meeting own needs, with the surplus being marketed through local farmers' markets; however, orders by local traders are also observed.

In the raspberry production sector, direct marketing channels are established by farmers and cold store operators. Cold store operators, in our case Yugent Food, have the role of traders. Yugent Food, through its intermediation, arranges regular exchange between the production and consumption sides. Yugent Food builds cooperative relationships with farmers, who represent the main source of raspberries, thus enhancing its capacity to meet the high expectations of its global customers. The relationship of cooperation is a consequence of the customers' stringent requirements which bind all marketing channel members through accountability. Raspberries are delicate and their quality begins to deteriorate already at the moment of harvest. The fruits lose their firmness, molds develop owing to the juice being released, and the fruits eventually rot. All marketing channel members aim to sustain fruit quality.

A more prominent role of fruit growers in the industry and trade domain would ensure competitive advantage and the proportionate growth of farm gate and export prices. Through analysis of a case study, this research has demonstrated that the opportunities offered by market-oriented operation require that all marketing channel members undergo a shift of their business orientation toward marketing-oriented agri-business, thus broadening the perspective of the marketing channel, which has so far had a distribution role. The presence of a degree of competitiveness between cooperating production and trade companies with a view to meeting consumers' needs is a guideline for a new agri-business system. In line with the new market requirements, producers will undergo the greatest changes. The analysis of the observed family farm, which is a supplier to a complex agri-business operator – Yugent Food – provides possible guidelines for the producer restructuring process. The selected family farm operates with obsolete machinery and without certificates. It has identified an opportunity in Yugent Food's well-organized marketing channel. This company has the characteristics of a modern agri-business system, since it performs an interpersonal, interlocal role, as well as circulation, storage, safekeeping, processing and packaging of agricultural products. A cost-benefit analysis based on the agri-environmental conditions present in Western Serbia, assuming planned budgeting and agronomic measures are properly applied, indicates a dramatic difference in relation to the calculation based on the Serbian family farms' agricultural practices.

The key conclusion of the research conducted is that the Serbian agriculture should secure its survival in the global competitive market by synchronized production and its integration, to the highest extent possible, with the stakeholders in agri-food products circulation within short and long food supply systems, following the model of developed economies.

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