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POSSIBLE SUPPLY CHAIN MODELS FOR SMALL AGRICULTURAL PRODUCERS IN SERBIA

Vlade ZARIĆ[a], Zorica VASILJEVIĆ[a], Danijela PETKOVIĆ[a]

ABSTRACT

Agricultural production in Serbia is one the most important segments of the national economy. Serbia is exporting more agricultural product than importing. Food processors who are responding to the wholesale and retail demand are looking for commodities with specific attributes. Industrialised agriculture grows and makes the rules on the market. In contrast, it has been recognised for some time that small agricultural producers in Serbia have been under huge economic pressure. As a result of impressive changes in market demand and in agricultural policy small agricultural produces in Serbia need to adjust their production structure. Market developments provide niche opportunities for small producers that are able to differentiate production and respond promptly. To capture these opportunity small farmers could use appropriate supply chains and supply chain strategies as well as decision making strategies for the development of partnership, especially planning for successful marketing. The aim of this paper is to analyse the supply chain models for the small Serbian farmers. The results show that small producers in Serbia face increased competition by big player in the market. The wholesale and retail permanently increase criteria for suppliers. Small producers have possibility to use niche opportunities in approaching consumers.

Key words: supply chain, agricultural producers, Serbia

MODELI MOŽNIH PRESKRBOVALNIH VERIG ZA MALE KMETIJSKE PRIDELOVALCE V SRBIJI

IZVLEČEK

Kmetijstvo je v Srbiji ena njpomembnejših gospodarskih dejavnosti. Srbija izvozi več kmetijskih proizvodov, kot pa jih uvozi. Predelovalna industrija , ki pokriva tudi grosistično prodajo in distribucijo zahteva dobrine s specifičnimi lastnostmi in v sodelovanju z industrijsko usmerjenimi pridelovalci določa tržna pravila. S tem so mali pridelovalci že dalj časa pod precejšnjim ekonomskim pritiskom in se morajo stalno prilagajati zahtevam na trgu. Razvoj trga jim omogoča vedno nove tržne vrzeli, ki jih tisti, ki hitro reagirajo uspešno izkoriščajo. Da bi lahko izkoristili tovrstne priložnosti lahko izkoriščajo primerne oskrbovalne verige in oskrbovalne strategije preko razvijanja partnerstev za uspešno trženje. Cilj tega prispevka je analizirati modele oskrbovalnih verig za majhne Srbske kmete. Rezultati kažejo, da se mali kmetje v Srbiji soočajo z naraščajočo konkurenco velikih ponudnikov. Mali kmetje imajo možnosti, da izkoriščajo niše v pristopih k svojim kupcem.

Ključne besede: preskrbovalne verige, akmetijski pridelovalci, Srbija

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1 Introduction

The supply chain models in Serbian agri-food branches presently are under high interest of policy makers, public and consumers. There are many reasons for these trends, but the main reason is the raising consumer awareness regarding health. The modern consumer wants to have precise information regarding the farming, marketing and distribution practices used to put agricultural products in the shelves on supermarkets. The rising consumer conscious about health cause additional regulation and market driven standards. In the following steps an already complex supply chain would have addition requests to the suppliers. This complexity is even higher in the case of supply chain that includes two or more countries. As Serbia liberalised the trade, international competition will increase and switch focus from a single participant, such as the producer, to the efficiency of the whole chain.

Primary producers have to adjust the production and marketing practices. In Serbia industrialised agriculture grows and makes the rules, while the small farm enterprise try to survive on the market. In Serbia there is no evidence of decline in small farm enterprise, but there is evidence that the number of rural household is going down. It is estimated that under current practices, even the largest group of small farms, having more than 15 ha (Table 1) would have difficulties to make a profit in the future.

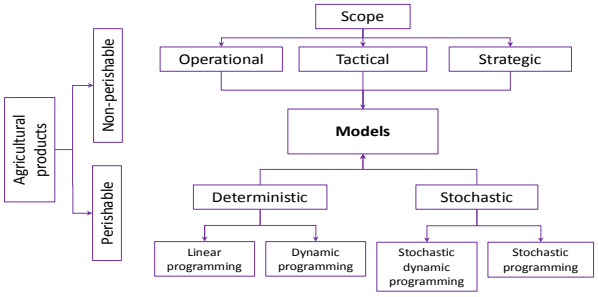
There are many initiatives proposed in Serbia to help and to save the family farms. However, usually all of those initiatives do not help farmers. Almost all activities have been developed from a policy point of view and not from the farmers' point of view. Very rarely the bottom-up approach and modelling is used. A positive impact could be made on small farms by development and implementation of models that include basic needs of farmers and opens new market and production activities. This paper gives an assessment of the supply chain models for small Serbian farmers. In this paper we focus on models targeted to be used by a single user, which is in our case a farmer. A single user could be agricultural company, too. In this paper we focus on agri-food supply chain models from the perspective of individual farmers or group of farmers.

There is numerous literature related to supply chain and marketing of agricultural product and review of application of planning models in the agri-food supply chain. In reviews from Glen (1987) models of crop and livestock production we analysed. In the focus of Lowe and Preckel (2004) review were main modelling approaches used in crop planning in the context of agribusiness. The review by Lucas and Chhajed (2004) focused on the topic of allocation analysis applied to agriculture related to location of warehouses and processing plants. The models applied on the micro level were reviewed by Ahumanda & Villalobos (2009). In this review authors make distinction between models using different criteria presented in the following table:

Table 1: Micro modelling approaches:

Factors to classify the models	Models applied on
Storability of products	perishable or non-perishable products
Scope of modelling	strategic, tactical and operational
Uncertainty	deterministic – liner and deterministic or stochastic – stochastic and stochastic dynamic

In the second step of the classification as a criterion authors used particularity of the modelling approaches used and analysed the models using linear and deterministic programming, as well as stochastic and stochastic dynamic programming. Figure 1 presents factors to distinguish models and possible field of application.



2 Background

Supply chain models of agricultural products in Serbia continue to be important, in terms of consumption and monetary value. In 2011 agricultural sector made up over 10% of Serbia's GDP. Contribution to the GDP of some agricultural sectors is actually expanding, like fresh fruit and vegetables which accounts for 22 % of agricultural production (SORS, 2012). A quarter of the country's employment, is in agriculture, whiles in rural areas, agriculture remains the largest employer of the economy (WB, 2006). Some 23% of merchandise export is agricultural origin. Since 2002 foreign trade with agricultural products in growing, and since 2005 there is a positive trade balance with agricultural products. Within agriculture, cereals and fresh fruit and vegetables are of strategic importance, contributing respectively with 29% and 25 % to total agri-food exports by value in 2011 (SORS, 2012).

At a primary level in the supply chain, farms structure is highly fragmented with a large part of small agricultural producers being semi/subsistence, and with a small part of industrialised competitive agricultural enterprises. In the food processing industry, the level of competition is low, because a few producers account for a

major market share. However, a different study shows that there is not market power (Zaric et al., 2010). Concentration in the food processing industry varies across branches. The food wholesale and retail chain responds to the customer and demands products with at competitive prices. Serbian consumers are being more aware of product quality and safety and there are growing requirements and standards along the food chain. Requirements of EU consumers, being the main export market for Serbian agricultural products, are higher and even Serbia's large food processors are not able to meet it. Therefore, only a small number of Serbia dairy and meat companies have a licence to export to the EU.

The Small Farms in Serbia

The total number of small-scale family farms in Serbia amounts 779891 (Census 2002, SORS), of which only 278351 are registered by the Ministry of Agriculture and could benefit from the state support skims (Directorate for Agrarian Payments, published on 10 may 2011).

Table 2: Number of smal scale farms in Serbia

Agricultural land in ha	Number of holdings
Without land	6,288
< 1 ha	208,100
1-3	254,832
3-5	135,161
5-8	96,843
8-15	62,326
> 15	15,341
Total	778,891

Source: Census 2002

Of the total agricultural production on small-scaled Serbian farms, one part is used for consumption on farm and remaining part is direct sales, usually in the informal market. This model of marketing of own products means that those farmers have a very short supply chain and are not integrated into modern agri-food supply chain.

If those producers intend to sell products to the retail chain they have to have sustainable commercial relationships. To have a stable position farmers have to have contracts and meet the requirements of the retailers. Their market position is critical as they have to complain with the requirements of an increasingly demanding retail chain. Market developments provide niche opportunities for small producers that are able to differentiate production and respond promptly. This means that traditional patterns of farming will change because more products will be produces for international taste or for niche markets.

3 Method

Farms have to take decisions that have some similarities to the "classical" production and these are on the operational, tactical and strategic level. First of all, the question is how to operate the business that includes for example how to distribute, transport or store inventory. The next, tactical level includes decision on area to be planted, the choice of product to be planted, e.g. GMO or not, application on pesticides, fertilisers, irrigation, choosing the mode of transport from the farm to silo or market. Those two levels, operational and tactical, could be discussed only after the strategic decisions have been made. To make a strategic decision farmer have to now external market demand. For him this is given variable that he could not change and have to adjust his tactical and operational decisions that he could influence. The strategic decision is related to the customers and how to serve them successfully. The strategic decision means to select the most efficient, profitable supply system to the customer (Jang & Klein 2011).

In this paper we used the conceptual micro model approach as presented by Ahumanda & Villalobos (2009) on the strategic level, supported by supply chain model integrated into complete enterprise model as shown by Jang & Klein (2011). This model will allow small farmers to take the best decision regarding supply chain. In introduction we discuss about possible micro level approaches and on this point we briefly describe the model used for taking a strategic decision. The basic questions regarding choosing a supply chain is to sell product directly or participate in a group with other farmers, and if join the group, the question is how large to make this group. Small farmers could benefit from belonging to a group, but there are several open questions, e.g. contracting and pricing policy. The strategic decision is not simply and not uniform for all situations.

To make a model authors (Jang & Klein 2011) made assumption such as homogenous farmers, deterministic demand and a single product type. Each farmer sells product directly, demand is stochastic, and the demand and price do not depend on other suppliers like supermarkets or industrial farmers. Because of small quantity no one homogenous farmer has access to larger customers like wholesale or supermarkets.

If farmers would have a marketing group, and change a supply chain they could have more stable demand. However, by accessing larger stable market, the uncertainties of local direct market disappear, but the sales price per item will be lower than the price of the local direct markets. The further assumption is that total production of group of farmers is larger than demands of larger customers, so each farmer is selling one part within the group and remaining part in direct marketing. Decision rules for the small farmers is not to change supply chain models and stay in direct marketing if the expected marginal price of direct selling is larger than the price obtained in the group. If farmers produced quantity is larger than certain threshold value he should be group member. In other situation decision of a single farmer depends on the size of the group. The describe approach we use to analyse situation of Serbian small agricultural producer.

4 Results and discussion:

The describe model we applied to analyse the small agricultural producers of the most important export products cereals and fruit.

Case 1: Wheat and Corn

Wheat is traditionally grown in Serbia and farmers do not organise themselves into marketing group and have a very short marketing chain. As the farmers do not have storage capacity, just after harvest wheat is transported to the next silos and sold to the silo keeper. Only some farmers use the possibility to keep it at silo and sell it later after harvest while the wheat price is rising. Very small semi-self-sufficient farmers in the remote areas do not sell wheat at all, but use for feed on the farm.

The reason why farmers do not organise group in marketing of wheat is not only because of the price relation, but mainly because of different product quality and uncertainty regarding the selling price. The state in the past often passed the regulation that violates economic rules. For example, if the market price of wheat was high, the state prohibited international trade, which reduced demand and price were quickly falling.

Similar to wheat, small farmers sell the corn in direct marketing. The big advantage is that farmers have a storage capacity and could decide on the time of selling. As the demand on the local level is usually from the small livestock farmers the join a group would not have advantage. The rule is that farmer that has a high quality corn would be the first one who will sell, and the others will follow. As a rule the local corn price depend on the corn quality. So the single small farmer is more stimulated to have a high quality and yield and not to join a marketing group.

Case 2: Apple and Raspberries

Both products are export products and depend on international demand. However, in the case of apple the domestic demand plays an important role, while by raspberries not. The possible supply chain for fruit is presented in the following graph.

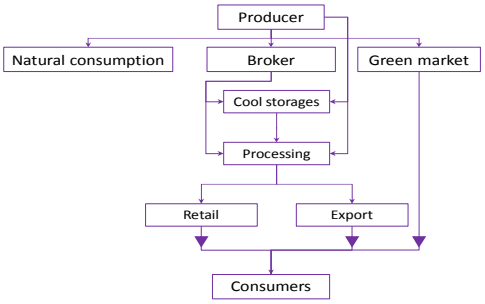


Figure 2: Possible marketing chain for fruit

In the case of apple, the farmers usually organising the storage and marketing group. On this way they succeed to change the supply chain and have stable demand. One part of product is sold true the group and other in direct selling. The reason for organising a group is to build a common cooling storage and keep product to the point the price is the highest.

However, after we remove the assumption of the stable demand, what actually happened in Serbia in 2013, because implementation of the agreement with the EU and opening of the Russian market, the supply chain model for small apple producers would be mo complex.

Raspberries are product which supply chain is going to broker, cool storages, processing and retailer. The small farmer sells the product to the broker or cool storages, so it has a very short marketing chain. Those farmers do no organise a group because they are very fragmented and on the local level there is only demand from one buyer, broker or cool storage. Natural consumption does not play significant role, as well as marketing on green market. The product is perishable and without cooling is not possible to keep it after harvesting. Possibility to change a supply chain would be that small farmers organise a group which would invest in the cool storage.

The future supply chains models of small farms

Previously we discussed the existing supply chain models of small agricultural producers under assumption that made situation more general. At this point we discuss the future supply chain model for the small farms in Serbia.

Processing industry and trades ask for quality requirements, which also mean use of specific inputs, like fertiliser and crop protection chemicals, investment in capital assets, e.g. packaging houses and cool storages.

At the present situation in Serbia the organisation of processing and export marketing is separated from the organisation of the production.

This mainly because of the high transactions costs that exist in the case buyer have to deal with small farmers. However, common activity by small farmers, would allow buyers to deal with organised groups and decrease transactions cost.

In some situation small farms enjoy a competitive advantage over large commercial farms, in the form of their low transaction costs in accessing and supervising motivated family labor (Binswanger & Rosenzweig, 1986; Eastwood, Lipton, & Newell, 2004). Small farms usually have high local knowledge and could have high reputation regarding product quality. However, small scale leads to high unit transaction costs in almost all other transactions that are not connecting with labor, e. g. in accessing capital, market and technical information, inputs and output markets, and in providing product traceability and quality assurance of products.

Small agricultural producers still have some advantages on the local level. Domestic consumers believe that products of small producers have a high quality. Consumer at the local level purchase smaller quantity which is suitable for small producers. However, this advantage will be lost by liberalization of international trade.

The select appropriate supply chain model for small farmers in Serbia could build on existing informal arrangements between small agricultural producers. Those agreements work in practice and typically are between already most advanced farmers at the local level.

Choosing a supply chain models, and be member of the farmer group depends on the decision making on the small farm. If on a small farm, younger farmers are not evolved in decision-making process on the farm and do not have independence and a sense of ownership, they may leave farm and seek job opportunities outside of the family farm. Such farm probably would be not able to change supply chain models.

Some specific aspect that influences the supply chain models in Serbia is subjective opinion on "good farm manager". The large numbers of Serbian farmers are born on the farm and their farming knowledge got doing agriculture. Their understanding of agriculture depends on their social and cultural environment.

5 Conclusion

In this paper we analysed the possible supply chain model for small agricultural producers in Serbia. Modelling in usually applied to industry and to agricultural enterprises. The model presented here is a step in developing the tool for decision makes on the micro level. This should help small scaled farms to be competitive and stay in agriculture. Choosing the best supply chain would help producers to reduce costs and increase quality and service to the consumers and get higher value of production.

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Študije potrošnih navad
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