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INVESTIGATION OF SEA BUCKTHORN PRODUCER COOPERATIVITY POSSIBILITIES: CASE OF LITHUANIA, LATVIA AND POLAND

Abstract

Strong farmers' individualism limits their competitiveness. Smaller commercial agricultural producers find themselves at particular disadvantage. The sustainable agricultural paradigm requires farmers to receive adequate and regular income (which is independent of the crisis factors), and to preserve an environment and a biodiversity. However, Lithuanian farmers rarely take common actions in the market. The aim of article is to create an organizational system that allows different sizes of sea buckthorn growers' farms to work together merging into cooperatives and producers' organizations. There is suggested a merging system for different size buckthorn growers' farms which allows unionize local, zonal and country cooperatives.

Key words: buckthorn, cooperatives, producer organizations

So far Lithuanian and Polish farmers have not been very interested in the common market activities or the opportunities to use the support of structural funds for the development of marketing activity. Competitive capacity of these farmers was highly limited by their individualism. Smaller agricultural producers are in an especially unfavourable situation. Pursuant to the paradigm for sustainable agriculture, farmers shall be provided with a stable income (not depending on crisis factors), shall comply with the environmental protection requirements and ensure biodiversity conservation.

Cooperation of farmers gives a possibility to ensure stable income, improve farmers' status in the market, get larger share of the added value created in the production circulation chain, and more effectively apply the measures provided within the framework of the European Common Agricultural Policy. In the EU Programming period 2014–2020 it is anticipated to promote the establishment of organisations producing various agricultural and livestock farming products, initiate their institutional recognition, and allocate support funds to strengthen administration and marketing activity. Thus, farmers acting in cooperation are provided with a possibility to receive additional support from structural funds.

Today farmers are quite slow in joining a cooperative activity. During this period it is important to promote and accelerate the establishment of agricultural production cooperatives and producer groups. This might become a significant factor facilitating a breakthrough in increasing the effectiveness of farmers' activity. Usually the main initiators of producer groups and cooperatives are the leaders, i.e. the initiators of changes. Best practice examples play one of the main roles in rural areas.

Although the demand for sea buckthorn has increased in the European market, small sea buckthorn farms still prevail in Lithuania. Farmers have difficulties in ensuring timely harvesting of the sea buckthorn, as well as its processing and preparation for the market. Besides, the sales of the sea buckthorn could be a profitable activity only in case of huge volumes of production which is properly processed and introduced to the market. This is possible only if producers are able to establish cooperatives employing intensive/advanced sea buckthorn growing/storage/marketing technologies in organising the operations in national and international markets.

The success achieved by the current agricultural producer groups is a very important psychological element increasing the interest in the common activity. From the psychological point of view mergers of agricultural farmers is a process, not one-time phenomenon. This process requires time to change the attitude of farmers. From the economic point of view these changes are too slow.

Establishment of economically viable and effectively operating producer organisations is one of the main conditions for the increase of competitiveness of Lithuanian agriculture facilitating the resolution of multiple problems: reducing production/realisation costs and increasing producers' income. Besides, the established structure and system would allow to follow technological and structural innovations of sea buckthorn producers of other countries, review their progressive experience and ensure timely provision of relevant information to farmers. This information is especially important for farmers developing organic farming in Lithuania since they encounter specific and yet under-investigated problems related to the selection, planting, care, prevention (from diseases and pests), harvesting, storage and realisation of sea buckthorn production.

156 farmers grow sea buckthorns in Lithuania, the total covered area is 1900 hectares. The majority of sea buckthorn producers are small farmers. Size of the fields varies from 5 to 10 hectares. Only 30 of them is processing more than 30 hectares. Sea buckthorns farms in Latvia are even smaller than in Lithuania. 16 sea buckthorn producers cultivate totally 240 hectares. The different situation is in Poland. Here are only several sea buckthorn plantations, which are distributed all over the country. Every sea buckthorn plantation counts more than 50 hectares. It allows to create needed infrastructure on it's own account.

Cooperation in berry sector of the Baltic states is analyzed in a fragmentary [Gulbė, Gailitis, Grazdins, 2003; Motuzienė, Ramanauskas, 1996; Ramanauskienė, Vaznonis, 2007; Pareigienė, Ribašauskienė, 2008]. These studies, in most cases, are limited to the situation review and finding of the desired

changes. Foreign authors also do not analyze sea buckthorn sector very wide, because of the novelty of this kind of activity [Lee, Beveridge, 2003; Sinkh, 2008]. As the background to the sea buckthorn producers' cooperation model the cooperation of berry sector in Poland were analysed. Nevertheless, sea buckthorn sector is very specific, because of complex and expensive sea buckthorn berry picking and berry processing process, high entry to the market costs. All of these problems forced sea buckthorn producers to seek for local cooperation models. The need for such studies discussed European and World buckthorn growers Congress (Sea Buckthorn EuroWorks 2010, ISA 2007).

Aim of the Research: to propose organisational system providing a possibility to various size sea buckthorn producer farms to work together by merging into cooperatives and producer groups (PG).

Data and Methods: the paper includes the analysis of the economic literature and legal documentation. During the research a semi-structured interview method was applied with respect to Lithuania's cooperatives and producer groups from neighbouring countries (Latvia and Poland). 26 respondents were interviewed by structured questionnaire: 4 in Poland, 2 in Latvia and 20 in Lithuania. Medium sized (10–50 acres) of sea buckthorn plantation growers participated in the survey in Lithuania and Latvia. Successful fruit cooperatives operating in the market for at least two years were interviewed in Poland. With all of the respondents were interacting directly. 27 semi-structured questions were given to the respondents.

Questionnaire covered common issues associated with sea buckthorn growing areas, volumes, available equipment, the products sold on the market or remain untaken away in yields and unrealized output, the distance between farmers planting sea buckthorn, also known on the wishes of the farmers co-operate in the setting up producer organizations and their knowledge of co-operatives and producer organizations. The survey carried out in 2012 October–November.

Interviews were not strictly regulated and this allowed to maintain a comfortable atmosphere during the dialogue between an interviewer and respondent. Certain questions have been prepared in advance and partially standardised. This provided for the collection of information about the experience in establishing and pursuing the activity of cooperatives and producer groups. The activity has also included: the analysis of the production sales procedure, the EU and national support, analysis of PG establishment problems, arrangement of documentation, and planning, organisation, management, control and accounting peculiarities. Survey allow to identify the sea buckthorn growers business needs to specialized equipment. It also allows to find out the position of sea buckthorn growers about the join cooperation use of this equipment. The study used farm certification authority to provide statistics on the sea buckthorn growers farm size and the distribution all over the country.

Methods of the Research: analysis of relevant literature and legal documentation, application of case studies, and statistical methods for data analysis. Inductive reasoning method has been applied for the data analysis.

Outcomes

The survey results showed that all growers in all analyzed countries are facing similar problems. Small planting areas are difficult in appropriate cultivation. Cooling equipment has not enough capacity. Specific harvesting equipment is very expensive. The only way to cheapen the harvesting process is to stimulate cooperation between small and medium farms in using the join equipment and other capacities.

The Research revealed that establishment of producer groups is directly related to the development of cooperatives. Yet, in Lithuania the establishment of cooperatives is too slow, the majority of establishments are very small with low membership and low turnover. Such a situation developed due to the lack of farmers' interest and lack of trust in other farmers, including complicated conditions for a receipt of funding/support, and bureaucratic obstacles etc. [Motuzienė, Ramanauskas, 2006; Pareigienė, Ribašauskienė, 2008]. Although practically all legal entities unifying fruit and vegetable producers (cooperatives) can seek the recognition of the status of Fruit and Vegetable Producer Group (Organisation) [*Regulation*, 2007], they don't hurry to do that.

First of all this is related to the fact that members of a small cooperative recognised as a producer group/organisation will not benefit from the activity, since the amount of possible support depends on the value of production sold in the market, i.e. from an organisation's turnover. Since Lithuanian cooperatives are usually small, this is one of the reasons why none of producer groups/organisations has been recognised in the country.

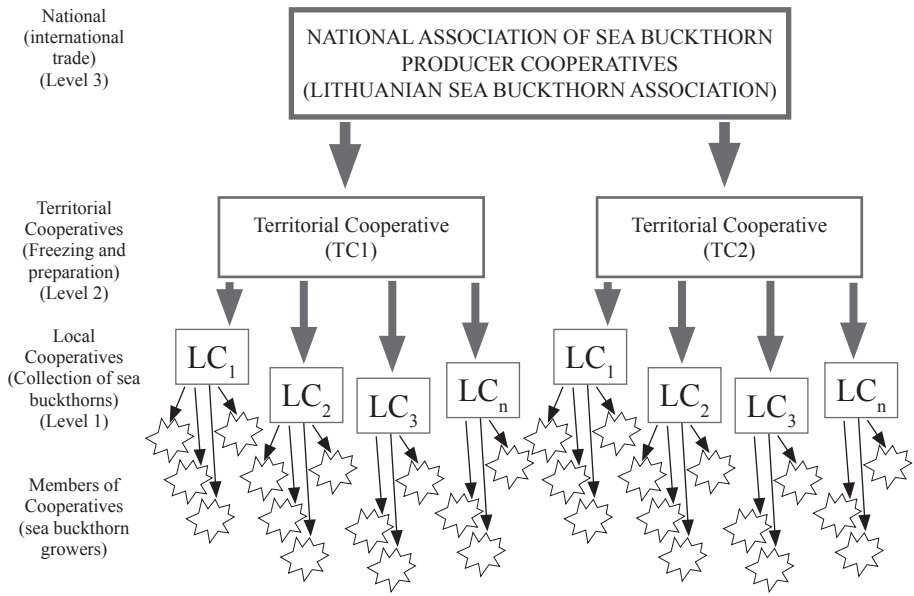
Although Poland has achieved certain progress, it is still believed that small--scale merger of agricultural producers is one of the main weaknesses of Poland's agricultural sector [Chlebicka, Fałkowski, Wołek, 2008; Sęk, 2011]. It is considered that many cooperatives and producer groups (PG) have been established only for the purpose of receiving financial support and that upon the expiry of financial period more than half of such cooperatives will disappear. Although the country has more than 1900 hectares of the sea buckthorn fields, small farms prevail (from 10 to 1000 hectares, average farm covers about 30 hectares). Due to long distances between different producers they face problems in establishing cooperatives. Besides, small producers don't have enough funds for the establishment of a cooperative (difficulties in maintaining administration/premises throughout the year). According to producers low cooperative's turnover rates prevent from surviving in the market and ensuring proper status of a cooperative. One of the ways out could be promotion of larger cooperatives with higher turnover which could afterwards become effective producer organisations. This could be achieved by establishing a system integrating cooperatives and merging small and large sea buckthorn producers. In view of this the suggestion was made to promote the establishment of cooperatives and their territorial merging.

It would be possible to establish local (or 1st level), territorial (or 2nd level), national (or 3rd level) and international cooperatives. The system integrating different level cooperatives is presented in Figure 1.

Local (1st level) cooperatives can be involved in the collection of sea buckthorn stems in the fields of the cooperative members and in their transportation to territorial entities. They could unite the producers of quite a small territory (e.g. one or 2–3 municipal territories). One of the advantages of small cooperatives is that their members know each other very well, are aware of each others' capacities and skills. This could make their work easier (including joint activities, appointment of a cooperative's board and other managers). Such cooperatives could be very attractive, independent, easily controlled etc.

Local cooperatives might establish 2nd level cooperatives and/or merge with joint stock companies.

Figure 1. Model of integrated sea buckthorn producer cooperatives



Source: developed by the authors.

Territorial (2nd level) cooperatives (producer groups) unite agricultural cooperatives of a larger territory. They merge producers of several (5–15) municipalities, use large refrigerators, berry sorting and further processing equipment, etc.

Territorial cooperatives can establish national 3rd level cooperatives (producer organisations).

National level (3rd level) sea buckthorn trading cooperatives could unite 2nd level cooperatives. Besides, for these cooperatives it is important to be recognised as producer organisations and, based on the support provided to organisations with the above status, to use efficiently the advantages of cooperative operations.

Thus, one of the functions of local cooperatives is collecting the berries from producers, sorting and delivering to territorial cooperatives. Territorial coopera-

tives freeze, pack and prepare big berry batches for a national cooperative involved in the national and international trading.

The owners of all level cooperatives are the members who take part (or are substituted by their authorised persons) in the discussion of all relevant issues; they can also be selected members of the cooperative association board.

Higher level of the cooperative merging provides more opportunities for acquisition and use of a more sophisticated and expensive equipment/advanced technologies, and develop marketing services, etc. Besides, the above system allows different capacity sea buckthorn growers to join the cooperatives. Large farmers and agricultural companies are reluctant to merge with small producers; they prefer mergers with equal partners. The suggested system provides for the establishment of large and small local producer cooperatives. In order to solve common problems, local cooperatives merge, as equal partners, into territorial and national unions (associations), i.e. into producer organisations.

There is also a possibility to establish **International Cooperatives** (***producer organisations***) merging large national cooperative units of separate countries. International relations and establishment of joint cooperatives with foreign farmers, and participation in the activity of international organisations enhances the development of national agricultural cooperatives.

Establishment of an international association or involvement in its activity is very useful since this contributes to the increase of a total turnover (economies of scale); there is a possibility to organise common production (by introducing specific goods, as components, produced in other countries), improve marketing, and develop cooperation among the farmers. At the same time it is also important to evaluate inevitable difficulties: management and control operations of the above cooperatives; differences in the national legislation; language problems and long distance between the countries.

Danish, Norwegian and Swedish cooperatives related to processing of various agricultural products could serve as an example of merging the national cooperatives into international cooperatives. Working in cooperation they managed to establish modern and efficient companies capable of disseminating their products throughout the world.

The analysis of the international cooperative development trends revealed that cooperatives of small countries (e.g. Luxembourg, Switzerland) are more inclined to join international cooperative organisations differently from the large countries (e.g. Germany) with the developed extensive domestic market.

Thus, despite national differences in the sphere of history, economy, culture and habits, globalisation has determined similar national economic developments and created the preconditions for a more extensive and long-term cooperation. This leads to the conclusion that internationalization of cooperatives (producer organisations) will increase in the near future, and that organisational, financial, marketing and other cooperative regulations will have more common provisions.

During the research respondents highlighted the importance of territorial distribution of cooperatives (producers) for their economic efficiency and viability.

Initial investigation showed that sea buckthorn growers need to create a cooperativity-based sea buckthorn berry harvest processing and deeper processing capabilities. It was emphasized, that such capacities layout where the highest concentration of sea buckthorn producers appears within the country. The importance of optimization of this process were emphasized.

The authors of the paper suggest using a linear programming theory to consider the issues related to distribution of cooperatives (target assistance) [Motuzienė, Ramanauskas, 1996; Lee, Bravo-Ureta, Ling, 1986]. The task is formulated as follows: *m* number of sea buckthorn producers (further referred to as Suppliers) with the product amount A_i (i = 1, 2, 3, .., m) and n number of cooperatives (further referred to as Beneficiaries) with the demand for this production B_j (j = 1, 2, 3, ..., n). This process could be divided into two stages:

- First stage: suppliers (producers) supply products to 1st level cooperative (Recipient); Second stage: 1st level cooperative (supplier) supplies products to 2nd level cooperative (Recipient). Thus, according to the above estimations, in one case Recipient is a cooperative, in another case Supplier is a cooperative;
- Suppliers are dispatchers and companies supplying raw materials or finished products. These are farmers and other farm workers supplying berries, and cooperatives delivering products after the first processing;
- Recipients are the companies purchasing berries. These are cooperatives collecting (purchasing) sea buckthorns from their members, as well as various companies (processing cooperatives) purchasing sea buckthorns from the cooperatives.

Resolution of this task included evaluation of actual and possible suppliers and recipients. The transportation plan had to ensure efficient transportation of consignments and meet the demand. The capacity of cooperative companies and their location have also been estimated so as to minimise the construction costs of future facilities, equipment and production transportation costs.

The price of product unit transportation from Supplier *i* to Recipient *j* is marked C_{ij}, whereas the amount of production delivered by *i* Supplier to *j* Recipient is marked X_{ij}.

The costs related to the amount of transported consignment X_{ij} will be $C_{ij} \cdot X_{ij}$ and transportation price:

$$\sum_{j=1}^{m}\sum_{j=1}^{n} C_{ij} \cdot X_{ij} \rightarrow \min. \qquad (1)$$

The equipment price of *i* cooperative is marked $F_{i,}$ the unknown $Y_i = 1$ if company will be equipped, and $Y_i = 0$, if company will not be equipped. If main suppliers are the cooperatives with the to be equipped companies, it is assumed that the amount of the supplied production will not exceed company's capacity, i.e.

$$\sum_{j=1}^{n} X_{ij} \le A_i \cdot Y_i (i = 1,2,.....,m). \qquad (2)$$

Product demand is known, therefore the condition for meeting the demand is:

$$\sum_{i=1}^{m} X_{ij} = B_j \left(j = 1,2,.....,n \right). \qquad (3)$$

Task solution condition:

$$\sum_{i=1}^{m} A_i \geq \sum_{j=1}^{n} B_j. \qquad (4)$$

General task model looks as follows:

$$F_x = \sum_{i=1}^{m} \sum_{j=1}^{n} C_{ij} \cdot X_{ij} + \sum_{i=1}^{m} F_i \cdot Y_i \rightarrow \min. \qquad (5)$$

In case of restrictions in the supplied production amounts by product demand and under condition of undeniable variables:

$$X_{ij} \geq 0 \left(i = 1,2,.....,m \right),$$
$$\left(j = 1,2,.....,n \right).$$

When the unknown are: $Y_i = 0$ or $Y_i = 1 \left(i = 1,2,.....,m \right)$.

This is a mixed task. X_{ij} is an equivalent variable, and Y_i – whole variable. Objective function is expressed in two linear functions, where one function shows transportation and the second the equipment costs (the sum) of new companies.

In order to simplify the estimation of the model for distribution of cooperatives in the country, the following assumptions were taken into account:

- Good management of production, processing and realization companies;
- No production and transportation problems;
- The aim of all companies is maximum net profit; therefore these companies will select a target market in the regions with least transportation costs;
- Transportation costs of production unit do not depend on the amount of transported products and on transportation routes;
- Products are homogeneous, therefore they are of equal value for the recipients;
- National products shall meet the demand;
- Illegal trade is outside the focal area;
- Period of time: one year;
- Citizens‘ income is sufficient and all products are sold during this period;
- Negative amount cannot be transported;
- Product transportation costs shall not exceed product sales price.

This is the only solution, unless two or more suppliers find two markets which are equally beneficial. In this case there is more than one optimal product transportation plan.

Application of the elaborated methodology facilitated preparation of the plan for optimal distribution of national sea buckthorn producer companies (suppliers

of raw materials) and sea buckthorn refrigerating companies (recipients of raw materials). This Plan provides optimal locations for 4–5 refrigerating companies in the country's territory.

Application of the proposed methodology gives the following advantages for the developers of cooperative activity (producer organisations):

- Reduced distance for transportation of raw materials helps to speed-up realization of sea buckthorns. It also helps to ensure better quality of berries and reduce transportation costs/one kilogram of berries.
- There is a possibility to demonstrate advantages of a cooperative company, encourage more farmers to join sea buckthorn growing activity in smaller areas which are not suitable for growing other plants.
- Development of infrastructure facilitating the establishment of new jobs in rural areas and ensuring additional income generation in rural territories.

According the analysis of medium-sized sea buckthorn growers farms and plantations, five places where it is appropriate to set out the territorial cooperative capacity were recommended. The first, near the Alytus country, bringing together 16 producers operating in Lazdijai, Alytus, Marijampolė, Prienai ir Elektrėnai districts. The second one, near the Naujoji Akmenė, bringing together 44 producers operating in Akmenė, Mažeikiai, Telšiai and Šiauliai districts. The third, near the Panevėžys, bringing together 22 sea buckthorn growers from Anykščiai, Biržai, Panevėžys, Molėtai, Kėdainiai, Rokiškis, Ukmergė and Utena districts. The fourth, near Jurbarkas, bringing together 11 sea buckthorn growers from Jurbarkas, Šilalė, Raseiniai and Šakiai districts. The fifth, near the Klaipėda, bringing together 9 sea buckthorn growers from Kretinga, Klaipėda and Šilutė districts. In the first three cases, you can capture the territory in which the operating buckthorn growers appear, near which could be necessary to form a cooperative capacity. In two other cases, the recommended area does not capture a single grower, so the cooperative capacities can be established only if individual growers plan to develop their farms in these areas.

Conclusions

1. The success and development of sea buckthorn growers' business is related to the ability to buy expensive harvesting and berry freezing equipment. Each farm has a limited financial capacity to purchase the necessary equipment, so the most rational way to have the necessary fruit processing capacity is to organize equipment cooperatives.
2. Establishment of producer organisations is hindered by the size of cooperatives which cannot guarantee a required extent of trade turnover motivating to seek the support for market development allocated to producer organisations.
3. Larger farmers merge into cooperatives and producer groups more successfully, whereas small farmers who could survive only in cooperation

with others have more doubts and difficulties in merging with other companies.

4. An integral hierarchical system for merging various size sea buckthorn producer farms into cooperatives helps to ensure a well-structures process for the establishment of local, territorial and national cooperatives and producer groups, and clearly specify the content of the activity of different level cooperatives.
5. While optimising the activity of producer organisations (cooperatives) uniting sea buckthorn producers, a special attention should be given to justification of location of logistics objects of these organisations in the territory of the country. This is a very important factor allowing to reduce production costs, production transportation losses, and ensuring quality parameters of the berry yield.
6. The process of the establishment of producer groups/organisations in the sea buckthorn business is still very complicated. So far the promotion of cooperative activity and explanation of its benefits to farmers is insufficient.
7. Spatial pattern analysis of Lithuanian buckthorn growers suggested to form five territorial cooperative capacity layout areas.

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