

Application of Logistics Systems in Dairy Sector in Latvia

Agnese Radžele-Šulce¹⁺

¹ Latvia University of Agriculture, Faculty of Economics, Department of Business and Management

Abstract. Latvian dairy sector is characterized by low value added per employee and it can be considered as fragmented that results in weaker bargaining power and higher unproductive costs that do not add value to the products. But it is also considered that in concentrating product supply and also demand logistics plays an important role: helps to reduce unproductive costs and serves as an instrument to add product place and time value. Therefore the paper looks at the economic conditions of the Latvian dairy sector and the practice and economic benefits of the developed logistics systems and components. Milk collecting and marketing are basic and the most important activities of the Latvian dairy sector logistics systems. Dairy sector cooperative societies of Latvia have developed the strongest logistics systems that have improved the situation of dairy farmers in Latvia, with the largest gain being higher milk price. The logistics systems of the largest cooperatives also engage in the supply of production inputs.

Keywords: logistics systems, dairy sector, cooperation.

1. Introduction and objective

Logistics systems are of big significance in manufacturing and business but it has especially importance in the agriculture sector. It is possible that this reason has motivated researchers (Vaněček, Toušek, 2006; Cheowtirakul, 2005; Krishnamoorthy et al., 2005; van Dyk, Maspero, 2004; Vaněček, Kaláb, 2003; Jensen, Pompelli, 2000; Henchion et al., 1999; Radžele-Šulce, Popluga, 2008 a.o.) to pay special attention to the research of logistics systems in the agriculture sector. Studies comprise a wide range of themes: flow of resources, its management and optimisation; minimizing risks; use of outsourcing; IT applying in logistics systems; impact of state policy; infrastructure. The need for the use of logistics principles and systems in the agriculture of Latvia is mainly determined by the fact that agriculture and processing are fragmented and dispersed and for agricultural enterprises to be competitive, they should offer bigger and bigger volumes of homogenous quality products for a low price and within a possibly short time period. Developing successful partnerships in managing logistics systems is a way how to maintain and strengthen the market position.

The **objective of the paper** is to study and analyse the basic economic conditions for the need for logistics systems development in the dairy sector of Latvia and to analyse the practice of the application of logistics systems. To characterise and evaluate the economic conditions of the agriculture sector statistics methods were used – dynamic time sequence analysis, structure analysis, data generalization. To receive information about the operation of logistics systems in agriculture enterprises, the author carried out 36 profound interviews with experts (Year 2010). Enterprise management and employees dealing with logistics organisation in agriculture enterprises were chosen as experts. Also information gained from the dairy sector 32 professionals „Brain storm on the future of the dairy industry in Latvia” (Year 2009).

2. Results

2.1. Economic Characteristics of Latvian Dairy Farming

⁺ Corresponding author. Tel.: + (371 26 383 067); fax: +(371 63 084 987);
E-mail address: (radzele@llu.lv).

According to 2009 data, the value of milk in the total agricultural product values in producer prices comprises 19% but in 2008 in EU this proportion was 15%. The value added created by dairy farming per employee in Latvia is about 3 times smaller than in EU – EUR 7 thou. in Latvia but EUR 26 thou. in EU. It can be explained by the fragmented milk production structure. As it can be concluded from data of Agriculture Data Centre, in 2009, 86% of dairy farms are small (up to 5 cows) and they concentrate 28% of the dairy cows in Latvia. Decrease of the number of herds since 2005, but at the same time the rate for the increase in the number of cows. Thus the average size of the herd has a tendency to grow. Such positive changes have also affected cow productivity – from 2000-2009 the average productivity increase for 31%.

Analyzing the data about milk processing enterprises, it can be concluded, that significant changes in the distribution in milk processing enterprises based on processing volumes after quotas in 2006/2007-2008/2009 cannot be observed. The largest proportion in Latvia is made by small and medium-size processing enterprises. The produced volumes in the enterprises are comparatively small – about 15.6 thou. t a year per enterprise. Five stable large enterprises operate in the industry, which annually process about 70% on average of the total produced volume of milk.

The amount of physically supplied milk for processing has increased by 50% over the 2000-2009 period, which is a positive tendency, but considering the tendencies over the last three quota years not so positive changes can be observed – in 2006/2007-2008/2009 quotas the number of suppliers that deliver milk directly to the processing enterprises has decreased by 37%. The proportion of the supplied milk in the total milk in the country has also decreased from 75% to 67% respectively. This situation characterises the tense relations in the country between processing enterprises and producers, which is mainly related with the purchase price determined by the processors and the incommensurability between the purchase price and the retail price. The mark-up of processing enterprises even increased in 2008 (when the milk purchase price in the world was decreasing), but for producers the milk purchase price was sharply decreased – by 31%. (Krievina, 2010)

Due to the tense relations between the processing and production sector and taking into consideration that certain milk producers have little buying power, producers are looking for the opportunities to facilitate their impact in the market. In agriculture, which is characterised by small business entities (especially at the global level), cooperation may transfer the advantages of large business entities to the smaller members. (Smit et al., 2010) The available data about EU countries prove that the average supply volumes from a farm (146 t) exceed the indicator of Latvia (37 t) almost four times, but five largest milk processing enterprises in Latvia purchase about 400 thou. t, which determines a small producers' buying power. In 2009, 33 agricultural service cooperative societies operated in dairy farming, which unite 20% of the total number of milk producers and 2 milk processing cooperatives (hereinafter referred to as CS), which makes 7% of the total number of processors'. The volume of CS collected milk has rapidly increased in the total volume of purchased milk, from 25% of 2006/2007 quota to 34% of 2008/2009 quota or for 41%. The average purchased volume per one CS in Latvia is 6.4 thou. t a year.

Big CS have been capable of providing a 16% higher milk purchase price than the average in Latvia and for 14% higher than the processing enterprises in Latvia pay. The development of cooperation in the industry and accession of Latvia to EU have also facilitated the export of milk and dairy products. Starting with 2004 (when both big CS began their operations), a rapid increase in the export of milk, sour cream and dairy products can be observed – the growth rate for volumes was 5% a year, for the value – 4% a year. When problems in the industry became more acute, a sharp fall in the export value is observed in 2009 – by 24%, but the volumes have decreased only by 4%, which allows concluding that milk export volumes in Latvia are stable but the export value is affected by the changes in the world market.

2.2. Developed Logistics Systems in Latvian Dairy Farming

Further author offers a summary of characteristics of the components of dairy logistics systems in Latvia.

The supply component is organised:

- 1) common purchase for CS members and organised supply;
- 2) in the large farms the supply component is organised by their managers or employees;
- 3) intermediaries, sales agents or the producers themselves through direct sales supply part of the farms;

- 4) micro and small producers purchase irregularly and transport themselves.

Advantages from the CS organised supply are: the possibility to purchase products for a cheaper price and to reduce transportation costs combining the delivery of products required by several farms in one route, as well as to decrease the number of money transfers because when supplying the required raw materials and materials the CS bill their members at the end of the month from the received money for milk. But individual farms, even if they have joined CS, choose to organise the necessary supply of raw materials and materials themselves. It has several reasons: the farm is not satisfied with the quality of the CS offered products, their price or product range; the farm has a long cooperation and thus loyalty with another supplier; CS does not perform farm supply a.o. reasons.

Micro and small producers most frequently purchase the necessary goods irregularly, as they can and usually in small volumes. Most often they also transport the goods to the farm.

Whereas, mainly services of logistics companies are used for importing the necessary goods, because deliveries are irregular (seasonal character) and not always order is a full truck load.

Milk collection and transportation component operates in four forms:

- 1) the milk of the CS farms is collected and transported by CS organised transport;
- 2) in some regions intermediaries offering transport services operate and they collect or purchase milk on contractual basis and deliver or sell it to the processors;
- 3) pushed by mutual competition, milk is collected by processing enterprises with the help of the transportation company they possess or intermediary transport;
- 4) few of the large dairy-farming specialized enterprises that produce 10-15 t milk daily maintain their own car park.

When cooperating with milk transportation service providers, payment terms are differentiated based either on the quantity of the transported milk or the distance driven. More and more logistics systems of the industry use the terms based on the transported volume.

For many micro and small farms one of the problems to be solved is cooling and storing of milk as purchasing equipment for cooling and storing milk may not pay back, but losses are created by selling insufficiently and not precisely cooled milk because processor pay less for it. "Small" milk collectors, coolers and warehouses, introduced by some CS is not a wide phenomenon yet, besides their number has decreased, which can be explained by the fact that costs of the milk collected in this way are three times higher, according to experts.

Distribution of dairy product component uses the following channels:

- 1) most of the products are sold in shops (about 50-60% of the production is sold in the network of Rimi and Maxima supermarkets);
- 2) catering sector (cafes, restaurants, canteens);
- 3) for producing other food products (e.g. bakeries);
- 4) at the market and in the form of other direct sales.

Milk processing enterprises organise product distribution to the shops: directly to the shop; to the logistics centres of the big supermarkets (Rimi, Maxima); to the wholesalers or individual wholesalers arrive for the products themselves. The following is used for transportation: processing enterprise transport; services of the daughter company belonging to the processing enterprise or outsourcing (can be even from a wholesaler).

Developing the evaluation of practical logistics systems examples, enterprises were classified in three cases.

Case 1 – tree logistics systems of dairy farm cooperatives - the author chose to analyse the logistics systems of two big cooperatives "Piena ceļš" and "Trikāta KS", because they both form 90% of the total net turnover of dairy farm CS, as well as they possess processing enterprises. For comparison another small CS "Straupe" was used as it is a successful example because it comprises a wide supply chain.

Case 2 – five largest milk processing enterprises in Latvia - in the capital of Latvia located SC “Rīgas piena kombināts” (hereinafter referred to as RPK) currently is the industry leader in Latvia and one of the leading in the Baltics. Also in capital located “Rīgas piensaimnieks” (hereinafter referred to as RPS) has been one of the largest food processing enterprises in Latvia and exporters. Other three largest processing enterprises are located in regions. SC “Valmieras piens” is the only one which produces a full range of dairy products. SC “Preiļu siers” is the largest cheese producer and exporter in the country. SC “Tukuma piens” with targeted investment has become one of the largest processors in Latvia.

Case 3 – two smallest milk processing enterprises of Latvia - SC “Smiltenes piens” specialisation is varied and exclusive cheeses and cottage cheese products. The production of the enterprise is located in two sites. But milk processing factory DK “Daugava” targets at the paying and middle-class customer and produces more than 40 kinds of dairy products that do not contain any chemically obtained additives.

Information about the characteristics of logistics components and their comparison in the analysed enterprises are presented in Table 1.

Table 1 Comparison of logistics organisation in the analysed enterprises

Enterprise	Producer supply	Milk collection	Distribution of the finished product	Use of other logistics outsourcing
ASCS “Piena ceļš”	OS	Transport of OS and the processing enterprise	OS	RW; PS
ASPCS “Trikāta KS”	OS	P; OS as required	An Ltd. belonging to the enterprise and OS	-
PCS “Straupe”	OS	P	P	RW; PS
RPK	-	OS and CS	P (ice cream) and OS (other products)	-
SC “Valmieras piens”	-	OS	OS	-
SC “Preiļu siers”	-	P	P	-
RPS	-	P and OS	P and OS	-
SC “Tukuma piens”	-	Enterprise related Ltd. and CS	OS	-
SC “Smiltenes piens”	-	P	P and OS	PS
DK “Daugava”	-	P and CS	P	-

P – provides itself; OS – outsource; DPR – distribution of production resources; RW – rent of warehouses, PS – processing services. Source: author’s creation based on the information from the interviews with experts.

At the end of the comparison of the logistics systems of the analysed enterprises the author offers common assessment of several indicators characterising milk collection component of dairy logistics systems.

Table 2 Characteristics of the milk collection component in the analysed logistics systems

Enterprise	No. of milk collection points	No. of routes	Average no. of farms per route	No. of milk delivery points
CS “Piena ceļš”	92	14	7	5
CS “Trikāta KS”	257	13	20	4
CS “Straupe”	105	7	15	3
RPK	300	20	15	2
SC “Valmieras piens”	400	26	15	1
SC “Preiļu siers”	2654	24	111	1
RPS	50	6	8	1
SC “Tukuma piens”	300	7	43	1
SC “Smiltenes piens”	220	9	24	2
DK “Daugava”	20	1	20	1

Source: author’s creation based on the information from the interviews with experts

These indicators significantly impact on the actual cost of the products, therefore it can be concluded that RPS and “Piena ceļš” use the milk collection component most effectively. CS use the advantage that they possess several milk delivery points and thus CS design more effective routes. But although SC “Preiļu piens” is the third largest milk processing enterprise in Latvia, it develops disproportionate unproductive costs in milk collection and it has to spend more time and resources for milk collection from small producers.

3. Conclusions

- 1) The basis for the application of logistics systems in the dairy farming sector in Latvia is made by economic business conditions:
 - The resource production exceeds the consumption level at the local market and sector is export capable. Whereas, to export, sufficient volumes shall be provided;
 - Sector is fragmented, which decreases the buying power of individual production units in the market and increases the proportion of inefficient costs;
 - The price of milk changes fast, is impossible to be forecasted and is sensitive to the economic a.o. processes in Latvia and in the world;
 - There are tense relations between the producers, processing and commercial sectors.
- 2) Big milk processing enterprises form vertically integrated, fragmented logistics systems that can be characterized by:
 - The large milk producers try to get included in them;
 - They comprise milk collection and the finished product distribution components, but they do not comprise producer supply and finished product sales components;
 - The logistics systems of milk processing enterprises, the location of which is related with problematic transportation aspects (in the capital of Latvia), are trying to reduce the number of milk suppliers attracting the large milk producers and also CS as partners, but logistics systems that are located in regions are trying to comprise small and medium-size milk producers from possibly close areas;
 - Practical research and experts' opinions prove that relations between the milk producers, processors and sellers involved in the industry are tense, thus the participants of the system change, their range is inconsistent, which does not facilitate the development of stable logistics systems;
 - They try to outsource milk collection and finished products distribution logistics to focus the costs on the production function;
 - They export a significant part (about one fifth) of the production volume.
- 3) Logistics systems of all small processing enterprises differ significantly:
 - In most cases they provide milk collection and distribution of the finished products component themselves, but the systems developed by CS – also supply of the producers and sales component of the finished products; Those systems that are trying to comprise fully also the sales of the finished product component provide the sales of the entire product volume in Latvia;
 - Horizontal cooperation in using certain production services component can be observed among the logistics systems of the small processing enterprises, which allows the service provider to use its capacity more fully whereas the service user can expand the product range;
 - The logistics systems of small processing enterprises in Latvia develop in various forms of the cooperation of participants and entrepreneurship.
- 4) CS in the dairy farming industry of Latvia have developed the strongest logistics systems that most widely comprise the components of the supply chain in dairy farming:
 - Those logistics systems that comprise all components of the supply chain are more independent and effective, which is proved by their determined higher milk purchase price in the industry;
 - In most cases the logistics systems developed by CS, in difference from the systems developed by processing enterprises, have several milk collection points, which provides for more effective organisation of milk collection.

4. References

- [1] A.B.Smit, H.J.M.Kortstee, N.J.Jukema, J.Meijaard, S.Oudmaijer, N.Idema, F.Pleijster, R.M.Braaksma, J.van Staalduinen. *Cooperation in partnerships*. Report 2009-082. The Hague: LEI. 2010, 233 p.
- [2] A.Krieviņa. Milk Price Distribution and Factors in Value Adding Chain. *“Economic Science for Rural Development”*, Nr. 21. Jelgava: LLU. 2010, pp.116-123.
- [3] A.Radžele-Šulce, D.Popluga. Role of Logistics for the Development of Latvian Meat Sector. *„Economics and Management: Current Issues and Perspectives”*, Vol. 14. Siauliai. 2008, pp. 95-103.

- [4] C.Cheowtirakul. Thailand, The Kitchen of the World: Logistics and Supply Chain Efficiency. *Food sanitation and hygiene*: Project Report. Thailand: Assumption University, Faculty of Biotechnology. 2005, 13 p.
- [5] D.Vaněček, D.Kaláb. Logistics in agricultural production. *Agricultural Economics Nr. 49*. 2003, pp. 439-443.
- [6] D.Vaněček, R.Toušek. Improvement of Logistics in Milk Processing Enterprise Madeta, inc. *České Budějovice (Czech Republic) Journal of Central European Agriculture*, Vol 7, No 4. 2006, pp.637-642.
- [7] F.Van Dyk, E.Maspero. An analysis of the South African fruit logistics. *ORiON*, Vol.20. 2004, pp.55-72.
- [8] K.Jensen, G.Pompelli. Marketing and Logistics Assistance Needs of Food Processors. *Journal of Food Distribution Research*. 2000, pp.1-10.
- [9] M.Henchion, P.O'Reilly, E.Pitts, J.Crowley, M.Dolan, R.Keary, A.Collins. *Increasing the logistics efficiency of Irish Food Exports: End-of-Project Report*. 1999, 13 p.
- [10] M.Krishnamoorthy, R.Wallis, S.Dunstall. Optimised Transport and Logistics Planning for Agriculture and Bulk Commodities. *CSIRO Mathematical and Information Sciences*. 2005, 4 p.