

USING LOGISTICS TO INCREASE THE VALUE ADDED OF LATVIAN DAIRY SECTOR

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Abstract

The paper focuses on examining the current development of logistics in the Latvian dairy sector and the further study of the application possibilities of the logistics methods to improve the creation of the value added in the sector. In the transition period of the Latvian dairy sector from a comparatively cheap production resource driven competitiveness, logistics is among the main tools for achieving competitiveness based on the efficiency. By facilitating the increase in efficiency and competitiveness, logistics can greatly contribute to the improvement of the value added of the sector.

Key words: value added, milk production, logistics, cooperation

INTRODUCTION

Milk production has traditionally been one of the most important agricultural sectors in Latvia. In 2007, the proportion of milk production accounted for 21.4% of the total agricultural output. The role of dairy sector in Latvia is larger than in the EU on average, where it equalled 13.8% in 2006 (Eurostat, EAA, 2008).

Currently the value added of Latvian dairy sector is comparatively low – EUR 7.1 thsd. per AWU in 2006, which is 3.6 times below the average level in the EU in 2006 (FADN, 2008). The main reasons for poorer performance are the comparatively lower level of capital investments in Latvia (ratio of depreciation/AWU in Latvia is 5.5 times lower than in the EU on average) and larger contribution of labour, which results both in lower labour productivity and the overall inefficiency of the utilization of production resources. As modern technologies and economy of scale are interconnected, because technologies require the scale to be profitable and a generally considerable increase in production volume is impossible without technologies, the fundamental problem of the Latvian dairy sector is a fragmented milk production structure.

The value added is closely linked with the competitiveness of the products on the market, because only competitive products can ensure appropriate demand, which is the basis for the production and creation of the value added. Up to now the competitiveness of the produced milk has been ensured by comparatively lower resource prices, mainly labour price, but the resource price pressure forces to base further competitiveness on efficiency, because increase in the concentration within the sector is inevitable. Although the economic slowdown has restricted increase in prices, it is unlikely that in an open market the remaining difference can exist for a long period of time. In the farm modernization and concentration process, logistics is among the main tools of increasing the production efficiency, which can mainly be achieved at the expense of lower cost level per production unit and larger bargaining power. The further development stage can also include creation of additional place and time value.

Nowadays the importance of logistics is increasing in many economic branches, especially in industry and business (VANĒČEK, KALÁB, 2003).

The review of the existing publications shows that there is a number of studies about the importance of logistics and its application possibilities in agriculture (HONEYMAN et al., 1996;

JESSUP, CASAVANT, 1994; RADŽELE, 2007), application of logistics outsourcing in agriculture (VANĚČEK, TOUŠEK, 2006), latest technologies and their application in logistics in agriculture (KRISHNAMOORTHY et al., 2005; MAYER, 2003) and about the experience and possibilities of logistics application in several agricultural branches. Although there has been a study on the formation of the value added in the main agricultural sectors in Latvia (MIGLAVS et al., 2006), up to now the formation of the value added in Latvian dairy sector has not been studied much; furthermore, a detailed analysis of the role of logistics to increase the value added has not been the focus of the existing research at all.

The **objective of the paper** is to examine the current development of logistics in the Latvian dairy sector and to further study the application possibilities of the logistic methods to improve the creation of the value added in the sector.

In the context of this paper, the value added is defined as the additional value which is created (added to the intermediate product) in milk production stage and which is distributed among the owners of production factors (land, capital, and labour).

Theoretical assumption envisages that the value added can be increased via increasing the production volume, by increasing output prices and reducing the costs of production. The improvement of vertical coordination between the primary and the processing stage can also give a significant increase in the formation of the value added.

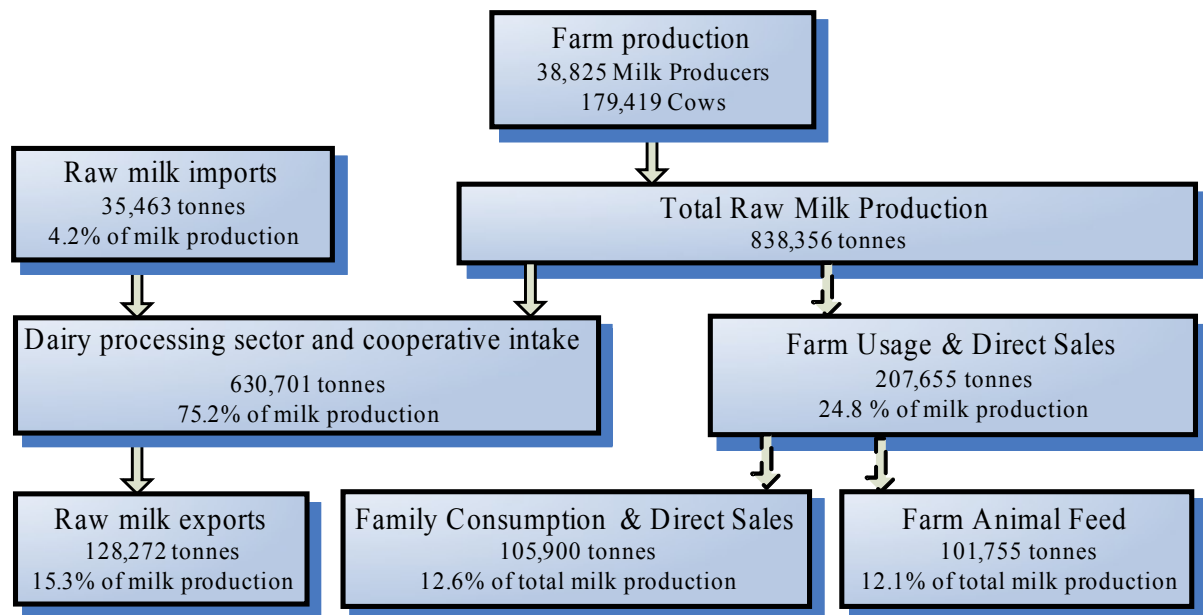
Logistics is considered to be a science dealing with the integrated management of all the material and the corresponding information flow from suppliers through the transformation of input materials up to the end-consumer.

The method of statistical analysis and logically constructive analysis were employed in data analysis. Dairy experts' survey results were used for the analysis of logistics role and application in the Latvian dairy sector.

RESULTS AND DISCUSSION

1. Production flows in Latvian dairy sector

Latvian dairy sector is characterised by the total milk production of 838.4 thsd. tonnes and 38.8 thsd. milk producers (farms with dairy cows) in 2007, which constitutes only 21.6 tonnes of produced milk per farm. Deliveries to dairies and cooperatives account for 75% of the production volume. Although market orientation of the sector has considerably increased in recent years, milk deliveries still comprise a comparatively small share in Latvia; the EU average for this indicator is about 92%. The average delivery volume per farm was 34.5 tonnes in quota year 2007/2008 (Agricultural Data Centre, 2008). A comparatively large number of enterprises (in view of the comparatively small capacity of the Latvian market and the total value of processed milk products) operate at the processing level (52 companies in 2006), but the industry is dominated by 5 large players which concentrate about 70% of the total milk intake.



Source: constructions made by the authors, based on the data of the CSB (Central Statistical Bureau) of Latvia

Figure 1 Raw milk flows in the Latvian dairy sector in 2007

About $\frac{1}{4}$ of all deliveries are sold to milk cooperatives. At the end of quota year 2007/2008, there were 34 milk producers' cooperatives in the sector, with the total number of 5975 members (15.4% of total milk producers). The existing cooperatives considerably differ in their number of members and milk collected. The 2 largest cooperatives – *Piena cels* and *Trikata KS* – collected almost half (48.1%) of the milk sold to cooperatives and accounted for 5.5% of all cooperative members. The importance of milk cooperatives has increased in recent years, which is closely related to the rapid growth of the 2 of the cooperatives since their foundation in 2003 and 2004. Most of the raw milk collected by cooperatives has been exported to Lithuanian dairy industry because of a more competitive price, which has helped to increase considerably the average milk purchase price in the sector in recent years. At the same time, it has been the reason for quite tense relations between the processing industry and the cooperatives. Despite the rapid development of the horizontal cooperation in milk collection and marketing, the volume of milk collected by cooperatives is still comparatively small, with more than half of the milk quota volume being in herds with less than 50 cows.

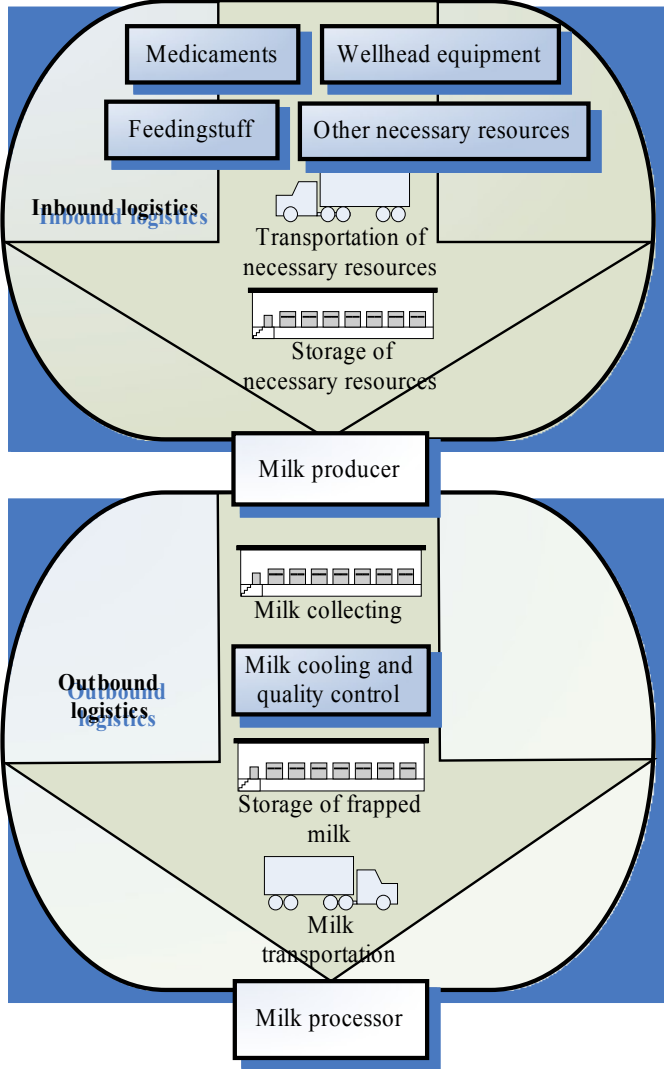
The coordination between the primary and the processing level is currently quite poor. Presently milk processing capacities of cooperatives are small, but they are determined to become major players also in the processing industry, which marks a positive tendency towards the direction of vertical integration. Cooperation between milk producers and dairies is of the contractual type and it is revised at least each quota year, so the present contracts do not ensure any guarantees for long-term cooperation.

From the volume of milk retained on farms, animal feed accounted for almost 50%, but the rest was used for family consumption and as direct sales. According to the review of quota fulfilment, 10.2 thsd. tonnes of milk were sold directly from farms in 2006/2007.

2. Logistics and its functions in the dairy sector

As nowadays logistics covers not only the production process but also the purchase of production resources and the delivery of goods to costumers, the functions of logistics can be divided into two broad areas: forming and management of raw material delivery channels, and management of goods distribution channels.

The main functions of both channels are: transportation, warehousing, order processing, transaction processing, preparing of forward graphic, packing, stock regulation, store management, and information accumulation. From the review of logistics functions it is possible to conclude that all of them can be directly connected with the dairy sector. Flows of materials resources in the dairy sector are presented in Figure 2.



Source: constructions made by the authors

Figure 2 Flow of material resources in the dairy production sector

In the process of milk production (Fig. 2), transportation flows as well as raw milk storage can be distinguished.

As transportation is one of the logistics functions which has the most impact on the overall costs (at least 1/3 of total logistics costs) and the formation of the value added, we further described the overall logistics functions in connection with this operation.

Transportation-connected overall logistics functions

Choice of transportation mode: when choosing the transport mode, an entrepreneur should consider very seriously what kind of [truck load](#) he wants to transport, and also how large the average truck load will be in the future, what the special requirements for transportation are, etc.

Choice of transportation service: to ensure an effective and successful logistics system in an enterprise, the formation of a separate logistics department is not the only possibility, especially in small dairy enterprises, because most dairy farms do not have regular flows of material resources (like feedingstuff, medicaments, etc.) and the finished product – raw milk – is produced in small amounts in 99.6% of Latvian dairy farms. Their own transport is profitable for farms that have at least 300 cows, but in Latvia only 0.4% farms have more than 100 dairy cows (CSB, 2008). To make this decision, an entrepreneur should also consider such aspects as costs of transport maintenance, driver salaries and a reserve variant if the transport breaks.

Logistics service buying allows an enterprise to concentrate all time and effort on its basic activity.

Collaboration or cooperation of several enterprises – an enterprise can create an effective logistics channel in collaboration or in cooperation with other enterprises both at the sector and the inter-sector level. The main aim of such an action is the consolidation of shipments that results in cost reduction.

Transport completion: the completion of shipments is a very important logistics function and it is different and specific for each agricultural sector. Collaboration and cooperation of dairy farms is one of the opportunities how to decrease transportation costs in terms of the completion of shipments.

Planning of route: as only few dairy farms have their own transport, this function of logistics is carried out mainly by cooperatives and milk processors in Latvia.

Preparing of graphics: as farms generally do not have their own processing and the raw milk expiry time is 2 days, it is important to plan graphics of milk transportation to milk processors without delays.

As truck loads of raw milk are often completed from an intake of a number of farms, well timed quality control is also important. That is achievable with effective preparing of graphics – quality control transport comes before raw milk transport.

Choice of transport fitting: as raw milk is an article of food, there are strict requirements for milk transportation and transport that are determined by the EU and national legislation.

Such functions as process pretensions to transportation enterprises, analysis of transportation costs, and transportation insurance are also connected with transportation.

Storage costs are frozen assets of enterprises; that is why it is necessary to minimize these costs. For this reason, the second function of logistics, which has been analyzed, relates to the stock regulation field.

The main functions of stock regulation field

Development of raw material and finished product stock regulation strategy and tactics – there are several stock regulation methods used in practice. In the milk production sector, the main raw materials are feedingstuff and also veterinary medicaments. As production resources are live animals, which require different composition of feedingstuff and medicaments, it is suitable to use a method that provides flexible, but in the time precise stock regulation strategy and tactics. Such strategy and tactics decrease the amount of frozen assets, which is very important for agricultural enterprises. From this point of view, the JIT method is most suitable; however, this method requires organization of frequent and small supplies of raw materials, which means that it restricts price cuts that are usually given for large shipments. Entrepreneurs can get price cuts and thus decrease costs of transportation if they cooperate with other farms and organize common purchase and transportation.

The same applies to choosing of strategy and tactics for stock regulation of finished products.

Short-term demand prediction of production – generally before starting to produce, agricultural entrepreneurs make agreements on the realization of production.

3. Application of logistics in the Latvian dairy sector

In the Latvian dairy sector, several elements of logistics systems already operate in the form of formal or informal contractual relationships, outsourcing, cooperation, and also integration.

Milk transportation from the place of its production – farms – to the processing enterprises is provided by four types of businesses:

1. - the big agricultural dairy enterprises, which obtain 10-15 tonnes of milk daily, maintain their own transportation department and deliver milk to the processors, as well as offer the remaining transport capacity as an outsource service to small milk producers;
2. - the milk of cooperating small-scale economy and small farms is collected and transported by the cooperative's own transportation department or an intermediary transportation service enterprise specialising in dairy transportation. The intermediary is attracted and controlled by the cooperative;
3. - in some regions, dairy transportation intermediary enterprises operate and collect or purchase milk and deliver or sell it to processors on a contractual basis;
4. - spurred by the competition, milk of all the other farms is collected by the processing enterprises that have their own transportation department or daughter company specialising in milk transportation.

Like any costs, transportation costs can be divided into variable (they change depending on the amount of service, the distance covered, the production volume transported, etc.) and fixed costs. The main positions of variable costs are: fuel, staff salaries (if they are attached to labour amount), order processing costs, loading and unloading costs. Fixed costs are made up by infrastructure maintenance costs (roads, bridges, transshipment terminals), transportation park maintenance, carrier's administrative costs. Unfortunately, businesses often consider only costs of fuel and drivers' salaries as transportation costs.

Road transport that carries milk has the lowest fixed costs because roads are not the enterprise property and are not managed by the enterprise, the transportation unit is rather small, loading and unloading operations in terminals do not require expensive equipment and facilities. However, variable costs are very significant and are comprised by fuel, taxes included in the price for different goals of the infrastructure maintenance, drivers' salaries, etc.

Thus, fixed costs (that in a regular situation constitute 10-15%) that are made up by load collection / delivery, as well as processing and loading operations are very sensitive to small loads if costs per unit are calculated. And this is a very actual and urgent issue for Latvian dairy logistics, because most of the producers are small and, consequently, the milk collectors should cover very many milk collector points. That is why in Latvia these costs exceed 15% in most cases.

Transportation costs per unit (55-70%) are not that sensitive to the covered distance or the size of the load.

Certainly, total shipping costs per unit reduce when the load volume increases, but milk carriers do not have such an influence to change the situation and it is impossible to organise a balanced load to be shipped in both directions in this sector. Thus, the only opportunity to reduce the transportation costs is to plan effectively the transport routes and to organise a full load unit on every route.

Currently Latvia applies a system that the total transportation costs are split proportionally among the clients, based on the transported milk volume irrespective of the distance. But in this situation the principle that the "nearest milk producer pays for the farthest" works, which places the first in an unfavourable position. Therefore, it would be necessary to supplement this system with price differentiation based on clients' distance.

As indicated by experts working in the cooperatives, another serious transportation problem is producers' unsteadiness, which is a widespread problem in Latvia – the milk processor offers a slightly higher price per litre (for 0.005-0.01 LVL¹) to the producer and the latter discontinues its membership, and the milk collection is organized further by the processor. However, after a while the processor lowers the milk purchase price and the producer wishes to join the cooperative again. Such a phenomenon is especially popular among bigger milk producers whose total monthly income is significantly increased by a small increase in the purchase price. Such a situation makes difficult the effective long-term operation and development of the cooperatives because it is impossible to rely long-term on a certain volume of milk from a certain route.

There is one more fundamental problem in Latvia – generally cooperatives do not have a unified strategy for member selection and they often operate in the territory of entire Latvia. The same situation is with milk processors that buy milk from farms spread all over Latvia. Consequently, the ineffective planning of routes results in higher transportation costs, which negatively affects the creation of the value added either through a higher cost level or a lower price received for the milk produced.

Another operation related to logistics is the cooling and storage of the milk. This is still a problem for many milk producing small-scale economy and small farms for which the purchase and maintenance of a milk cooler and frapped milk storage facilities is expensive and may not pay back but which incur tremendous losses for selling not appropriately, precisely frapped milk, for which processors pay a lower price. The “small” milk collector, cooling and storage points, introduced by some processing enterprises or cooperatives, are not met on a large scale yet. This certainly is a component of their own logistics systems for big and bigger milk producers.

The third problem is the supply and delivery niche. Milk producers need several products from other producers: concentrated mixed feed, mineral feed, sanitary goods, fuel, and biomaterials. The supply of these products is provided in four ways:

1. - joint purchase and organised delivery for the cooperative members;
2. - in the bigger and big farms, which are only a few in Latvia, their own logistics departments or the person responsible for logistics deal with these issues;
3. - part of the farms are supplied by intermediaries, trade agents or producers themselves as a result of direct sales;
4. - small producers irregularly purchase and transport these products themselves, which increases their production costs and makes their product less competitive.

CONCLUSIONS

1. Overview of the Latvian dairy sector leads to the conclusion that it is one of the most important agricultural sectors in Latvia. However, the situation analysis indicates that the value added of the Latvian dairy sector is comparatively low and there are some negative factors that hamper the development of the sector:
 - fragmented production structure;
 - lack of long-term cooperation between dairy producers (farmers) and milk processing enterprises, which is grounded on economic and juridical bases;
 - comparatively poorly developed operation of cooperatives and logistics.
2. Use of logistics in the dairy sector allows **reducing** costs in the following ways:
 - **reducing** fuel and handling costs by choosing more rational transport solutions;
 - reducing labour input and purchase costs for obtaining raw materials;
 - reducing transportation costs in terms of the completion of shipments;

¹ 0.005-0.01 LVL = 0.0035-0.0070 EUR

3. Logistics methods are used only by several enterprises and only for certain processes in the Latvian dairy sector. This indicates a great potential in terms of cost reduction and improvement in the creation of the value added.
4. In order to form an effective logistics system it is recommendable for dairy farms to use collaboration or cooperation with other enterprises both at the sector and the inter-sector level.
5. The formation of successful partnerships in managing of logistics systems gives to dairy sector enterprises more power in the marketplace because logistics chains are more competitive than individual agricultural enterprises.

REFERENCES

1. Agricultural Data Centre, Milk quota review at http://www ldc.gov.lv/v/lv/piena_kvotas/informativais_materials/cetri_kvotas_gadi.pdf [retrieved: 2008 11 04]
2. Agricultural farms of Latvia 2007: Statistical bulletins. – CSB of Latvia, Riga, 2008.
3. Central Statistical Bureau of Latvia public database on agricultural statistics at <http://data.csb.gov.lv/DATABASE/lauks/lkgadejie%20statistikas%20dati/Lauksaimnieciba%20mezsaimnieciba%20zvejnieciba/Lauksaimnieciba%20mezsaimnieciba%20zvejnieciba.asp> [retrieved: 2008 12 15]
4. Eurostat public database on agricultural statistics at http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/&product=EU_MAIN_TREE&depth=1 [retrieved: 2008 10 28]
5. FADN public database at <http://ec.europa.eu/agriculture/rica/database/database.cfm> [retrieved: 2008 12 12]
6. Honeyman, J., Titus, M., Barber, J. (1996). A Logistics Support Program for Rural Economic Development. Research results. North Dakota: Upper Great Plains Transportation Institute of North Dakota State University. August 1996. 18 p.
7. Jessup E. L., Casavant K. L. (1994). Logistical Efficiency Underlies Agribusiness Success. *Agribusiness Management. Washington State University. Cooperative Extension, College of Agriculture. June 1994.* pp. 1-3.
8. Krishnamoorthy, M., Wallis, R., Dunstall, S. (2005). Optimised Transport and Logistics Planning for Agriculture and Bulk Commodities. *CSIRO Mathematical and Information Sciences.* pp. 1-4.
9. Mayer, W. H. (2003). Agroffice – Wingis Based Applications For Precision Farming. *Proceedings of EFITA Conference,* pp. 393-400.
10. Miglavs, A., Leimane, I., Krievina, A. (2006). Economic analysis of value adding chains of the products of agricultural origin. Research results, Latvian State Institute of Agrarian Economics.
11. Radžele, A. (2007). Application of Logistics Methods and Instruments in Primary and Secondary Production Spheres in Latvia. *Humanities and Social Sciences Latvia, Proceedings Nr. 50, Riga: Institute of Economics, Latvian Academy of Sciences, University of Latvia.* pp. 89-105.
12. Unpublished information from the Economic Accounts for Agriculture.
13. Vaněček, D., Kaláb, D. (2003). Logistics in agricultural production. *Agricultural Economics – CZECH Nr. 49,* pp. 439-443.
14. Vaněček, D., Toušek, R. (2006). Improvement of Logistics in Milk Processing Enterprise Madeta, inc. *In České Budějovice (Czech Republic) Journal of Central European Agriculture Vol 7, No 4,* pp. 637-642.