Tools of Management Distribution Optimization in the Regional Economic Systems of a Trading Environment

G Demchenko[1], V Lukinykh[2], Yu Lukinykh[3]

[1]Krasnoyarsk State Agrarian University, Department of Logistics and Marketing, 44 I, E.Stasovoy str, Krasnoyarsk, 660130, Russia
[2]Krasnoyarsk State Agrarian University, Department of Logistics and Marketing, 44 I, E.Stasovoy str, Krasnoyarsk, 660130, Russia
[3]Krasnoyarsk State Pedagogical University named after V.P.Astafiaev, Department of Foreign Education, 89, Lebedevoy str, Krasnoyarsk, 660049, Russia

E-mail: somcl@mail.ru, yulla@bk.ru

Abstract. The study of current trends in the development of economic activity of enterprises in Russia, on the one hand, and the sources of economic growth, on the other hand, indicates a significant increase in the role of control instruments in the economic entities management. Considering the optimization system of distribution management, one can say that controlling provides accuracy, measurement speed and data reliability circulating in the management system of a modern commercial enterprise.

The increasing complexity in decision-making within the framework of strategic and operational controlling as well as the growing amount of information determine the task of developing methodological tools for effective distribution management in the supply chains of enterprises in the market trading environment.

1. Introduction

In present-day conditions there is insufficient development of the controlling systems of enterprises in the trading environment, managing distribution in the regional supply chains of the commercial enterprises with high demand for scientific and practical guidance from the market practitioners.

The objective of this study is to develop methods of distribution rationalization based on the formation of a controlling system of enterprises in the regional supply chains of the trade sector. The sequence of problem-solving is as follows:

• identifying problems in the supply chains of the modern commercial enterprises;

• determining the specifics of controlling in terms of influence of different-format factors on the commodity flows of enterprises;

• development of methodical tools of enterprise controlling in the regional supply chains of the trading sector that has allowed to create software for the operating functions of procurement, inventory management and supplier management;

• development of measures for the rationalization of distribution management on the basis of the author's program and a serial 1C complex – a method of 'ADR' (Automatic Delivery Rewards).

2. Essence of the problem

The analysis of the enterprises` problem operating in the supply chains showed its complex dependence of distribution on external and internal factors in the supply chains such as:

- external factors: instability of the factors` influence on the company, which creates high requirements for the enterprise management quality; globalization of financial actions, intensive involvement of financial entities in foreign economic work and the need to improve the methodology of information support;

- internal factors: need to find the most effective control algorithms that ensure the viability and stability of the company; lack of interaction and consistency in the work of different administrative services of the company [1].

Building regional supply chains, special units dealing with the specific form of the logistic activities are allocated at the enterprises such as procurement, transportation, warehousing, sales etc. Logistics management is a multi-format.

The essence of controlling in supply chains is the rationalization of decisions concerning both operational and coordinating activities that could lead to savings in the company's resources.

To clarify the controlling tasks, a general economic analysis of the enterprises divisions in the supply chains was carried out. As a result, the influence degree of various factors on the profitability of enterprises in the supply chain is revealed. Among them are geographical location; difference of investments in advertising activities; difference in assortment and price level; change of revenue structure by divisions from year to year [2].

The main disadvantages of logistics within the company are as follows: an objectives conflict of different departments of the same enterprise; difficult and slow information exchange between departments; poor coordination of various departments; excess inventory of all kinds; the lack of information on total logistics costs and as a consequence - inability of management; a high level of stock for the reasons of incorrect mix of the procured range of products; the imbalance by assortment groups of goods; imbalances within product groups [3].

3. Controlling in supply chains

When determining the controlling specifics in terms of different factors which influence the enterprises trade flows, one has formulated the concept of multi-controlling system in the form of a subsystems complex of analysis and harmonization of the key indicators of commercial enterprises in the supply chains.

On the one hand, controlling in the company consists in coordination of subsystems of planning, accounting, analysis, control and adjustment. In this case, complex aspect of enterprises` controlling refers to the calculation of the indicators of relationships, examination of the single financial indicators as well as skeletal elements of controlling, detection of the importance of each of them in the total functioning of controlling.

On the other hand, controlling in supply chains is the rationalization of decisions related to both operational and strategic activities that could lead to savings in enterprise resources. The system of controlling in the enterprise supply chains should be built taking into account fundamental principles: additivity; structural properties; the interdependence of structure and environment and the hierarchy [4].

The basis of the controlling system in the supply chain is a database of logistics operations, which are implemented mainly at the lower (operational) levels of management in the relevant functional units of the company and its partners. In most cases, the appropriateness of the allocation of the logistics operations should be dictated by practical possibility (and necessity) of accounting cost of resources (material, financial, labor, information, etc.) on its implementation, as well as capabilities of in-house accounting system (financial, accounting, document management system) and control and measuring system.

The effectiveness of planning and decision-making in the enterprise logistics system is largely determined by a properly constructed corporate database of logistics operations, which is part of the

overall database of the control and measuring system. At the same time every logistics operation should include the costs of financial resources, time and labor, which is the basis for the valuation of resources in the company and it allows to monitor the key indicators of logistics plan (KPIs) effectively.

Implementation of the KPI logistics system in the structure of the common balanced scorecard gives each company the following advantages in the supply chain:
- making action plans to implement logistics strategy;
- ability to measure the degree of achievement of the strategic goals of logistics and evaluation of current operations;
- transparent management of logistics business processes;
- improving the efficiency of logistics management;
- to control both financial indicators (logistics costs, fixed assets, inventory) and the most significant non-financial logistics indicators (service, performance of elements of the logistics infrastructure);
- reduction of time in decision-making [5, 6].

To solve the problems of external and internal negative factors, it is necessary to rationalize controlling in the following areas: insufficient marketing, inefficient merchandising, unsatisfactory level of service, high selling prices, the level of motivation of personnel, unsatisfactory stock.

4. Tools of distribution management

All the tools that have been proposed to optimize the activities of the commercial enterprise can be combined into five groups by the area of application. Table 1 provides a list of suggested tools within each of these subsystems of distribution management of the company.

The rationalization method within the first and second groups of controlling involves reorganization of communications with suppliers in the supply department of a commercial enterprise. Currently, in the procurement department of the enterprise the distribution of managers by assortment groups is carried out, when each manager purchases to specific commodity groups using all suppliers who supply goods to the group entrusted to the manager.

In such a system, each manager is responsible for a specific assortment group and can independently monitor its harmonious configuration both in terms of price and nomenclature content. However, in this case, there is another problem- overlapping contacts with suppliers, in other words, each supplier has to work with every manager, and this significantly complicates the communication process. The number of calls and text messages to each supplier increases in proportion to the number of managers in the supply department. This fact not only increases the costs of the company, but is also undesirable on the part of the supplier as the process of communication with the company takes a lot of time [4, 7].

Thus, based on the analysis of the distribution of managers by areas of responsibility, a new type of procurement organization was modeled, which is based on the principles of rationalization of costs (financial, human, hourly) and system management of the company's assortment, in which the manager is allocated a certain group of assortment positions and a related group of suppliers. In this case, the managers of the supply department work in the automated system 'ADR' based on the 1C program, which self-regulates the intersection of their work with certain suppliers and eliminates errors associated with double orders by different managers from the same supplier.

The study of the problems solutions of the enterprises in the supply chains in the trading environment of the market can allocate the tools of controlling for optimization of enterprise activity in five groups:

1st group - procurement volume planning system based on sales volumes;
2nd group - organization of purchases by product groups;
3rd group - automated order to suppliers (ADR) as a model of optimization of the enterprise;
4th group - three matrix method for supplier evaluation and monitoring;

5th group - balanced scorecard based on the measured key performance indicators of the enterprise units.

Table 1. Tools of distribution management.

№	Subsystems of distribution management	Methodical tools of distribution management
1	Planning and in-house coordination	Tools for planning sales volumes, procurement volumes, stock, based on a statistical sample for three years. In-house coordination is primarily associated with the simplification and formalization of internal communications within the company based on the sales plan and the use of basic planning functions in the 1C program.
2	Purchasing management	The tools of this group are designed to simplify and automate the procurement procedure as well as to improve the level of management of the company's stock. The principle of order based on the primacy of product groups is rebuilt. The subprogram 'Autoprice' for combining all price-lists of suppliers into a common format is developed. A digital algorithm calculating purchase volumes is developed and input into the database 1C.
3	Stock management	The tools help to identify and manage illiquid stocks to reduce the company's inventory. The algorithm of identification of illiquid stocks and the work order for prevention of their growth on the basis of Excel with the subsequent implementation in 1C and training of employees is developed.
4	Supplier relations management	Relations with suppliers are evaluated through digital indicators that are introduced into the proposed system of integrated assessment of suppliers. The method of ABC-XYZ-matrix for monitoring the work of suppliers is developed and introduced. Introduced A digital procurement calendar plan with sales and inventory optimization is introduced.
5	Controlling	External monitoring of failures in the procurement system and/or deviations in the forecasted volume of consumption will help to maintain the company's broad supply to the end consumer. For this reason a subprogram 'order point' is realized in 1C and the plan-factor analysis is carried out.

Inclusion of five groups tools in enterprise management will allow to form a model of multi-format controlling system. At the same time, the most important is the process of monitoring the activities of suppliers.

Supplier evaluation results are required to answer the following questions:

1.Does it make sense to cooperate with the supplier in general, or is it preferable to refuse to supply this product?

2.Is procurement policy with a supplier conducted properly?

3.What are the input parameters for procurement activities?

4.What are the conditions of cooperation, as well as whether it is advisable to extend the supply contract on these criteria? [7]

Thus, a comprehensive analysis of suppliers will assess each of the partners in all of the above parameters.

5. Assessment of cooperation with suppliers by ABC-XYZ matrices

To assess the quality of cooperation with suppliers, the analysis by the method of 'three matrices ABC-XYZ' is made, where XYZ is the measured indicator of the quality of the provider and ABC are the parameters for a consistent assessment of their performance by the following indicators:

matrix 1 - sales volume by a supplier;

matrix 2 - purchases volume by a supplier;

matrix 3 - inventory volume by a supplier.

In general, for the entire analysis of the three matrices, it is necessary to use purchase prices, as the mark-up included in the cost of goods will distort the indicators.

At the first stage the analysis of suppliers on the level of sales expressed in purchase prices is carried out. Sales volumes are ranked by ABC parameters, where A is 80%, B is 15%, C is 5% of total revenue.

As an example from the practice of a commercial enterprise, it can be noted that for suppliers with whom cooperation was planned in 2017, 227,016 thousand rubles were sold in purchase prices, which amounted to 86% of all purchases made. Consequently, by refusing to cooperate with other suppliers, the company slightly loses its purchasing potential [8].

For each supplier, a group is defined according to two classifications: ABC and XYZ. If to output the data in general tables 2, 3 and 4, then one can interpret them as follows: reliable, average reliability, unreliable.

Table 2. Characteristics of suppliers depending on the group of finding the sales volume of its goods.

	X	Y	Z
A	AX A high share of total sales, the supplier is reliable	AY A high share of total sales, the supplier is of average reliability.	AZ A high share of total sales, the supplier is unreliable
B	BX A small share of total sales, the supplier is reliable	BY A small share of total sales, the supplier is of average reliability.	BZ A small share of total sales, the supplier is unreliable.
C	CX Very low share of total sales, the supplier is reliable	CY Very low share of total sales, the supplier is of average reliability.	CZ Very low share of total sales, the supplier is unreliable.

The second stage of the analysis is the evaluation of suppliers in terms of procurement volumes in purchase prices. That is, the group of suppliers A was accounted for 80% of purchases, the group of suppliers B - 15% and C - 5% of the total volume of purchases for 2016.

Table 3. Characteristics of suppliers depending on the group of companies by purchases volume.

	X	Y	Z
A	AX A high share of total purchases, the supplier is reliable	AY A high share of total purchases, the supplier is of average reliability	AZ A high share of total purchases, the supplier is unreliable.
B	BX A small share of total purchases, the supplier is reliable	BY A small share of total purchases, the supplier is of average reliability.	BZ A small share of total purchases, the supplier is unreliable.
C	CX Very low share of total purchases, the supplier is reliable	CY Very low share of total purchases, the supplier is of average reliability.	CZ Very low share of total purchases, the supplier is unreliable.

The third indicator to be assessed is the volume of supplier inventories expressed in purchase prices. This analysis also took stock figures for the beginning and end of the 2017 for the ease of estimating during the year [8].

For each supplier, a group is defined according to two classifications: ABC and XYZ. If to output the data in a common table, one can interpret it as in table 4.

Table 4. Characteristics of suppliers depending on the group of finding the inventory volume in the buyer`s warehouse.

	X	Y	Z
A	AX A high share of the total inventory, manipulation of goods in stock are rare, the supplier is reliable	AY A high share of the total inventory, manipulation of goods in stock are unstable, the supplier is of average reliability	AZ A high share of the total inventory, manipulation of goods in stock are often, the supplier is unreliable.
B	BX A small share of the total inventory, manipulation of goods in stock are rare, the supplier is reliable.	BY A small share of the total inventory, manipulation of goods in stock are unstable, the supplier is of average reliability.	BZ A small share of the total inventory, manipulation of goods in stock are often, the supplier is unreliable.
C	CX Very low share of the total inventory, the supplier is reliable.	CY A small share of the total inventory, the supplier is of average reliability	CZ A small share of the total inventory, the supplier is unreliable.

Thus, based on the results of the analysis, it can be concluded that the relations with suppliers are conducted correctly. If the supplier is unreliable, but his product is included in the sales in group A, it is a risk to the company. Such suppliers require close attention and a significant safety stock. If the sales of the supplier are low, and purchases (and, therefore, stocks) are high, this supplier is repacking, therefore, it is necessary to pay special attention on this situation. As a result of this analysis, we can

draw a number of important conclusions that will allow us to reconsider the nature of cooperation with the supplier, reduce the volume of shipments from him, and, perhaps, end up business relations.

6. Conclusion

In order to implement in practice a multi-format controlling system of commercial enterprises in regional supply chains, some measures have been developed to rationalize the distribution management on the basis of the author's program and the serial complex 1C – method 'ADR'.

In the most general form, we can distinguish five stages of implementation of the controlling management system at the enterprise:

1) decision-making;
2) preparation and formation of the management system;
3) 'obtaining' control in the current activities of the enterprise;
4) sustainable operation;
5) development of management system

In the research process a number of algorithms, software and operating procedures have been developed to rationalize distribution management at the commercial enterprise and its supply chains. Among them are work in AutoPrice; formation of reports for using partially-automated tool of procurement management; the system of evaluation of illiquid stocks in the company; document processing 'Algorithm' (document, 'mac') for a user; generating a report of ABC/XYZ analysis in 1C; formation of the report 'Point of order'.

The performed research was aimed to the solution of the actual problem of optimization of distribution management by forming a multi-format controlling system at the enterprise and in the regional chains of the trading environment. Its main idea is to develop measures built on a systematic principle to purposefully address the problem of management rationalization of the enterprise divisions operational activities.

The results obtained in the study contribute to the development of the theory of controlling logistics systems and improvement of management methods in the supply chains of commercial enterprises.

References

[1]   Lukinsky V S, Pletneva N G and Shulzhenko T G 2011 *Theoretical and Methodological* Problems of Logistics Processes Management in Supply Chains (St Petersburg: StPSIEM)

[2]   Uvarov S A 2010 *Logistics and Supply Chain Management* (St.Petersburg) Procurement logistics in SCM system vol 3(50) p 36

[3]   Ivanov D A 2010 Supply Chain Management (St Petersburg: Polytechnic university)

[4]   Lukinykh V F 2010 The Methodology of Multilevel Management of the Regional Logistics System (Krasnoyarsk)

[5]   Malygin D S and Demchenko G A 2016 *Proc. Int. Conf. Logistics Eurasian bridge* (Krasnoyarsk) Development of a group of key controlling indicators in the supply chain of an enterprise producing individualized products pp 214-217

[6]   Demchenko G A 2018 *Proc. Int. Conf. Logistics – Eurasian bridge* (Krasnoyarsk) Use of logistics approach in a company management pp 154-158

[7]   Demchenko G A 2019 *Proc. Int. Conf. Logistics – Eurasian bridge* (Krasnoyarsk) Systematization of controlling instruments in the trade and wholesale company 'Trikotazhopttorg' pp 90-97

[8]   Mishagin R A, Ermakova V E and Demchenko G A 2018 *Socioeconomic and humanitarian journal* (Krasnoyarsk: Krasnoyarsk State Agrarian University) Analysis of goods flow potential in agri-industrial complex of the southern part of Krasnoyarsky krai vol 1 (7) pp 70-80