

# Modern Strategies for the Costs Optimization of the Logistic Centre

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**Abstract.** There are some strategic tasks for Logistic centre successful development with the samples presented in the paper, such as stock system monitoring; control of goods movements in/out warehouse; organization of local distribution and further delivery of goods till final consumer; and others. Considered decisions and right strategy allow to decrease the costs as it shown on the concrete example for creation of circular delivery routes. The contribution of logistics to competitiveness and value creation is a prime topic in today's market.

**Keywords:** Circular route, logistic centre, optimization, supply chain.

## I. SUPPLY CHAIN

The transport systems in the world are going through certain transition such as acquisitions and mergers and it is evident that the number of service providers will be further reduced. Few big ones will cover most of the world with "Round the World Service"

At the same time there will be substantial changes in the nature of the business: 10 – 15 years ago sea transport was based on point to point service in geographically defined areas, connected by certain hubs.

Today that are a global service network covering the whole world and the transport companies can offer true global

coverage. However this can lead to overcapacity in certain areas.

The general trends in the industry are:

- The transport companies increasingly participate in the logistics chain of their customers and must understand their requirements. This requires strategic partnership with systematic integration of the main business processes of a supply chain
- IT systems and continuous flow of information supposed to be the base for efficient transport and inventory control
- Clients get access to new technology and better utilization of capital
- Logistic costs are getting to be more variable but not fixed costs for the clients

Logistics and supply chain management continue to transform the competitive landscape and have become one of today's key business issues. Competitive advantage comes from responding to and serving the needs of end-customers. Logistics has a vital role in delivering this advantage, through the supply chain, in terms of short to medium term management tasks and longer term strategic plans.

One of the main modern strategies in logistic is to change the traditional supply chain to a new one. The traditional supply chain is shown in Fig. 1:

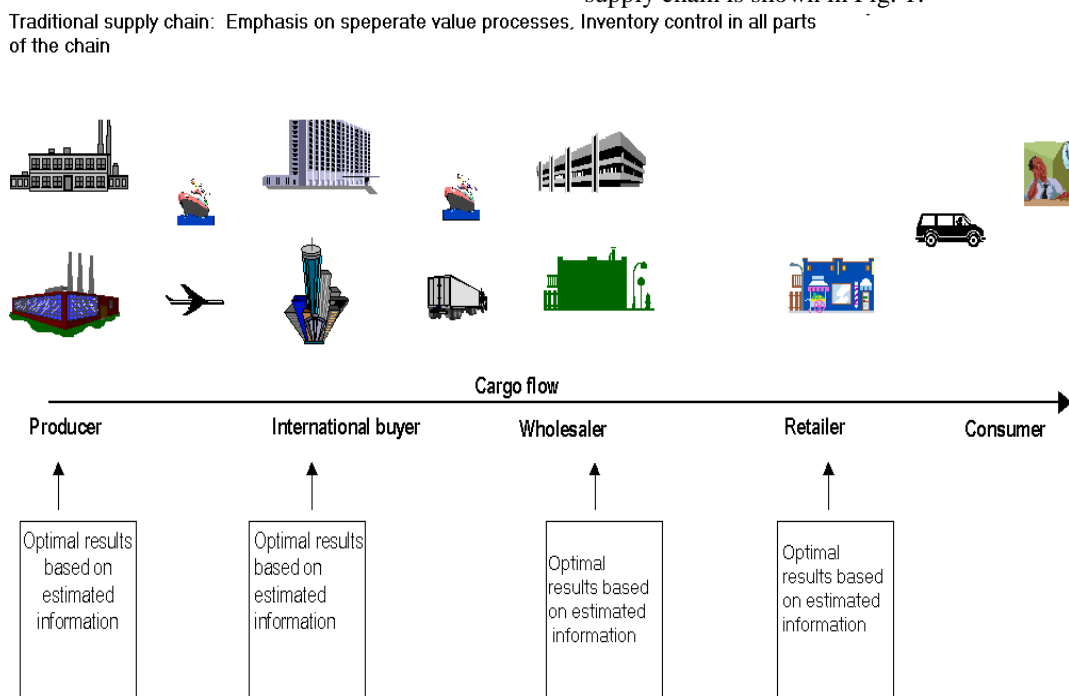


Fig.1. The Traditional Supply Chain

Bellow Figure 2 presents the new type of supply chain:

**New supply chain: Reduction of intermediates, Co-ordination of IT systems, Specialization, Consumer demand driven**

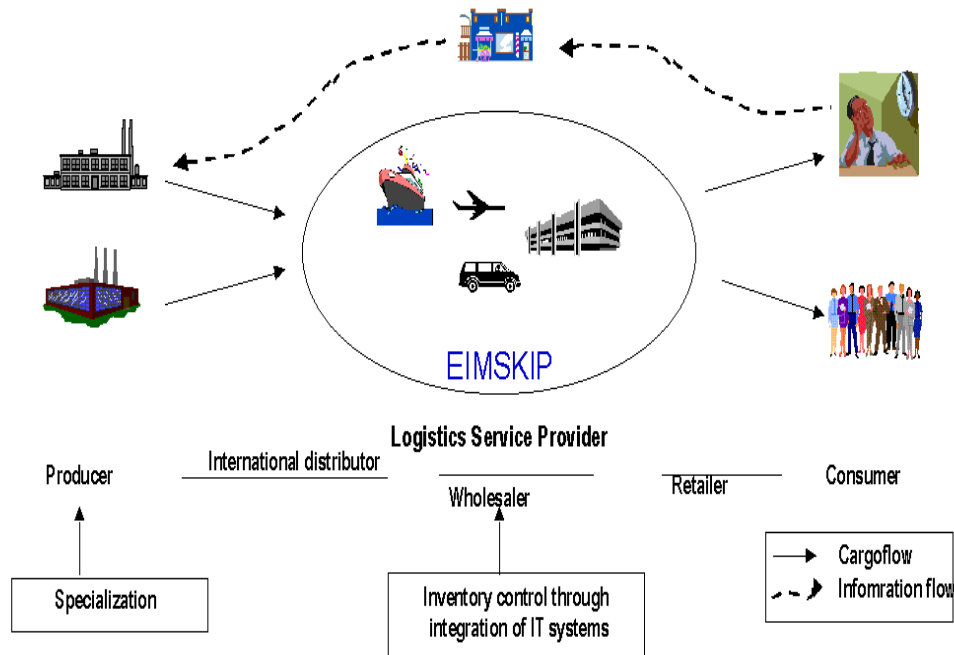


Fig.2. The New Supply Chain

The objective is to simplify the supply chain, minimize storage time and volume and maximize speed and efficiency of deliveries. The essential part is the information technology and efficient flow of information between the members of the chain as well as understanding the business and needs of clients. The main disadvantage of such approach is its long-run effect. It is real paradigm shift not only for the company but as well for all its clients and suppliers. This approach is actually based on trust and common values of the partnering companies.

As far as warehousing and distribution is an important part of the supply chain let's look at them more detail through the analysis of the work of Logistic centre.

**II. STRATEGIC TASKS OF LOGISTIC CENTRE**

The contribution of logistics to competitiveness and value creation is a prime topic in today's market. A practical, integrated and international strategy (approach) to logistics includes

- Competing through logistics - an introduction to logistics and its contribution to competitiveness and value creation,
- Leveraging logistics operations within the context of the customer,
- Working together - supplier partnerships, interfaces and the challenges of integration,

- Changing the future - leading-edge thinking in logistics and the future challenges ahead.

Working strategy for Logistic centre successful development defines the solving process of some specific tasks. These tasks are following:

**A. Creating of the system for receiving of full loaded and groupage containers and trailers into warehouse**

The first task for the Logistic centre is to get the goods into stock without any delay and in good conditions of goods and packing materials. In case the income of goods is quite rear event on the warehouse in general it does not bring any problem. However, if the goods unloading process is happened without termination because of many incoming cargo lots (trailers, sea containers or railway wagons), the certain managing system is needed in order to avoid transport queues and waiting time for delivery and unloading equipments. For an example, it reduce the time for unloading due to the driver gets unloading instructions on the way to warehouse or just on the gates during the territory entering.

**B. Sorting and selecting of cargoes in the warehouse**

In case there are many or a few different cargoes or they are owned by different clients in one transport lot they have to be sorted and selected very carefully according to transport documents (CMR, Packing list) in order to avoid of any mixing and missing of goods. Most of the cargoes demand own way of sorting based on the cargo and package type.

*C. Developing of the system for goods storage on the warehouse*

System for goods storage is created based on the Logistic centre internal rules and specific of cargo. In case of fresh products and frozen products the special temperature control equipment is needed. General cargo could be stored with normal working temperature from +10 till +25. Here temperature is regulated for warehouse workers comfort and in costs save conditions. Anyway storage conditions exist for each type of goods and manager of the warehouse should check and follow them. For instance, on the general cargo warehouse textile materials should not be stored near high smell goods (onion, perfumes, chemical goods), because the cloth quickly takes the smell inside. Another example are products like tea, sugar, corns and others for which the air humidity becomes very important, as it has high influence on such products quality conditions.

After all technical storage conditions are observed, the next step is to create the storage system. Cargoes could be stored just on the floor, on the pallets, shelves for goods which are packed on the pallets, on the box size shelves depends on the box sizes. In other words it could be any way of storage depends on the goods package type and size. On modern warehouses in order to reduce the expenses per square meter many floors shelves system are in use. Here each company uses own storage place marking with letters and figures based on the control and monitoring system. So each lot (counting pack) of cargo has own unique address on the warehouse. It makes very easy for the warehouse employees to find the needed goods, so save a lot of time.

*D. Stock monitoring system*

In modern Logistic centres specially created computer system for control and monitoring of goods movements in/out warehouse are used. Often it is one of the standard package like Microsoft AXAPTA (Dynamics AX) or Navision plus some specific modules based on company demands. However the human force is still the main in control and monitoring the goods on the warehouse. Usually the double, sometimes triple controlling systems are used. It means that there are 2 or 3 persons physically check the goods when goods come in/out of warehouse. It is related to not only the quantity of goods, but based on importance to check the quality of packaging materials or goods physical look too. For example: the goods coming to retail shops should have the good look not only of goods themselves but of packaging materials too, as it is important advertising tool for the trade owner. Clothing should be clean and accurately packed into plastic bags. Pairs of shoes and boots should be in carton boxes usually each pair separately in order not to destroy the form of the boots or shoes. Food should be well packed into clean and not destroyed form of package.

*E. Control and monitoring of goods movements in/out warehouse*

Growing of the large variety of goods in warehouses of different levels demands the developing of monitoring methods. There are two most popular methods named as

ABC-analysis and XYZ-analysis. In the beginning both methods were based on the same procedure: dividing into groups, but using different indices. However, today methods have separated fundamentally: ABC-analysis stipulates for groups creation from the whole quantity of goods; the object for XYZ-analysis is each item (or position) of goods whether it belongs to one or another group. ABC-analysis is widely used in logistics as a method of control and management of the stock. In fact this method is the modification of Pareto rule or „rule 80/20”. Conformably to reserve on stocks the Pareto rule means: 20% of goods from the whole quantity has 80% value of storing resources. ABC method - is the way of creation and control of the stock quantity through the dividing of all goods into three uneven subsets A, B, C based on the certain formal algorithm. The idea of classification of all items of stock into groups A, B and C was made by H.Ford Dickey, the specialist of the company General Electric in 1951. It was offered to use volume of sales, costs of the storage and etc. as the basic characteristics for classification into groups.

As the sample, let's look in the Table I showing the data for 20 positions of goods from the stock.

TABLE I  
 BASIC DATA FOR STOCK ITEMS

Basic Data			
N	$n_i$ , item	$P_i$ , LVL/item	$V_i$ , LVL
1	30	20	600
2	120	50	6000
3	200	2	400
4	10	30	300
5	20	7	140
6	400	5	2000
7	40	4	160
8	20	3	60
9	40	100	4000
10	20	1	20
11	100	4	400
12	180	20	3600
13	20	2	40
14	30	6	180
15	20	10	200
16	20	40	800
17	10	80	800
18	50	2	100
19	40	2	80
20	30	4	120
total	1400		20000

Let us decide the groups based on the value of goods according to bellow formula 1.

$$V_i = n_i P_i \quad (1)$$

where

$V_i$  - value of goods;

$n_i$  - quantity of goods;

$P_i$  - price of goods.

After the  $V_i$  calculations all positions of goods on stock are located in order of diminution of values. Then all positions are divided according to chosen ABC method. As a rule items of group A are not many, but take the significant part of financial values invested into the keeping resources. This is particular group for supply order creation for each item, controlling of the reserve quantity, costs of the delivery and storage.

Positions that take the middle part of the stock are put into group B. In comparison with items of group A they demand less attention and could be under usual current control of reserves and supply orders according to time schedule.

Group C includes majority of stock positions, however they took insignificant part of financial resources. Often goods from this group are not constantly controlled, but are checked once per period (once per month, once per half a year or once per year). Optimal quantity per order is usually not calculated for these goods.

TABLE II  
DIVIDING OF STOCK ITEMS INTO ABC GROUPS

Results of Data Processing				Group
N	$V_i$ , LVL	$q_i$ , %	$\sum q_i$ , %	
2	6000	30.0	30.0	A
9	4000	20.0	50.0	
12	3600	18.0	68.0	
6	2000	10.0	78.0	
16	800	4.0	82.0	B
17	800	4.0	86.0	
1	600	3.0	89.0	
3	400	2.0	91.0	
11	400	2.0	93.0	
4	300	1.5	94.5	C
15	200	1.0	95.5	
14	180	0.9	96.4	
7	160	0.8	97.2	
5	140	0.7	97.9	
20	120	0.6	98.5	
18	100	0.5	99.0	
19	80	0.4	99.4	
8	60	0.3	99.7	
13	40	0.2	99.9	
10	20	0.1	100.0	
	20000	100.0	100.0	

Sometimes there is necessity to make the fourth group D, which includes items located on stock without any changes from the moment of last inventory. For instance, all no liquid goods belong to this group.

Actually, ABC method is becoming popular in different areas. For example, during analysis of management time for taking decisions were found out dependence between main tasks solutions and their part in total quantity of tasks. So, group A consists of 65% of most important tasks that is about 15% from all quantities of tasks.

*F. Organization of local distribution and further delivery of goods till final consumer. Lean time decreasing.*

In this point distribution company has a chance of saving or wasting of money and time. So it is extremely important to optimize the using of transport tools (lorries, trucks and others). There are some different ways for optimization of resources. It is important to maximally use the loading capacity of transport tools and to minimize the tracking race for each single transport unit. There could be shuttle service or circular trip system. The shuttle service is usually used for the certain constant destinations, for example, for deliveries between warehouses or cargo terminals, or on the railway for deliveries between stations. The circular route is more flexible and therefore more popular. Here is the creation of special distribution route for the Logistic centre in the example bellow. It is the task for each distributor to create the optimal route to save time and financial and material resources.

*G. To design together the facility and delivery process to better reveal and support customer purposes*

Positive iteration within the process is supported and negative iteration reduced. The highest level of logistics supposes the full service which means transportation, goods storage and distribution for the customer. Often the supply of goods includes the research of supply market, finding of the best solution, based on the client requirements, and financing of the goods purchase with further resell to the client, who has ordered the goods. In this case the Logistic centre becomes a chain in the customer sales net. So it is in the interest of the Logistic centre and with it support that customer achieves his goals. For example: all the customers want to get goods just in time and without any problems. It is the task of the logistics specialists to predict all possible problems and difficulties that client may have during the goods delivery.

III. Numerical Sample for Creation of Circular Delivery Routes

Let us view the task for creation of circular delivery routes. Company sells the products and household goods. The considerable part of the goods (about 60%) is imported from the East Europe, Russia and Ukraine. In the same time about 40 % of goods are of Latvian origin. The trade activity of the company could not be without a good work of the Logistic centre of the company. The Logistic centre has five own trucks with the cargo capacity of 22 tons each. Three of the trucks deliver goods from Europe, Russia and Ukraine, the rest two distribute the goods from warehouse in Riga to clients in

Latvia. The analysis of the activity and cost evaluation of the Logistic centre showed that goods are often arrived with delays and expenses were constantly growing during last few months. The expanding of the trade activity and appearing of the new clients demanded additional transport services from the Logistic centre. Often all five trucks were using on the local Latvian market. Therefore some goods from Europe were coming late to the stock in Riga. That brought the additional costs to the company because of the shortage of the import goods, additional payments to the drivers, working extra hours, and expenses related to the empty race. The main reason for that was the wrong planning of the distribution routes, which demand additional time and fuel. The real task was put for the Logistic centre.

The initial sources for the task were the net of the clients with the destinations of their location (in km) shown on the Figure 3 and the volume of the deliveries in kg. There are 41 tons of cargo should be distributed between clients in the following points of Latvia: Ventspils – 4500 kg, Daugavpils – 6100 kg, Rezekne – 4700 kg,

Jelgava – 3200 kg,  
 Saldus – 5000 kg,  
 Jekabpils – 5700 kg,  
 Liepaja - 2400 kg,  
 Tukums – 5700 kg,  
 Madona – 5100 kg.

The Logistic centre has two trucks with the capacity of 22 t each. The task is to create 2 circular routes with the minimal summary extension for delivery of goods. In the same time each route should be connected to the truck in such way that the initial cargo volume does not exceed 22t.

This task was solved by the following way as presented below.

The points of destination were grouped according to their geographical location and the truck capacity as Table 3 shows.

We made the optimal route which provides the minimal delivery destination for each group of the delivery points.

The “minimal tree” for connection between all the points was created. After that we group the delivery points in routes based on the quantity of goods for delivery and loading capacity for transport unit.

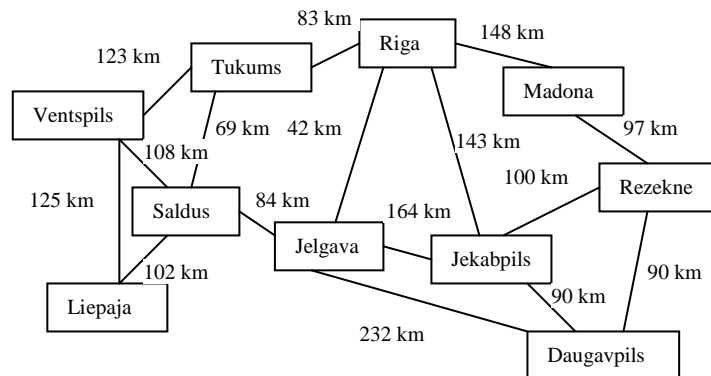


Fig. 3. Points Location and Destination between Them

TABLE III

GROUPING OF DELIVERY ROUTES BASED ON THE TRANSPORT UNIT CAPACITY

Route 1		Route 2	
Delivery Point	Delivery Volume,kg	Delivery Point	Delivery Volume,kg
Tukums (T)	5700	Madona (M)	5100
Ventspils (V)	4500	Rezekne (Re)	4700
Liepaja (L)	2400	Jekabpils (J)	5700
Saldus (S)	5000	Daugavpils (D)	6100
Jelgava (J)	3200	-	-
Total	20800	Total	21600

As soon as routes are created it is important to make the optimal order for goods delivery (visiting of points) for each

single route. The successful way is to make the matrix for each route, where the points included into route and the start point Riga are placed diagonally. There are the data of the shortest destinations between points are filled in the rest squares.

Solving both matrixes and using the increment formula the final optimal routes could be determined.

Route 1: R – J – S – L – V – T – R.

Route 2: R – M – Re – D – J – R.

The optimal routes are shown in the Figure 4. From this could be seen that one truck has a circular route starting from Riga with delivery to Jelgava, then Saldus, Liepaja, Ventspils, Tukums and back to Riga. Another truck also starting from Riga with the first delivery to Madona, then Rezekne, Daugavpils, Jekabpils and returning back to Riga.

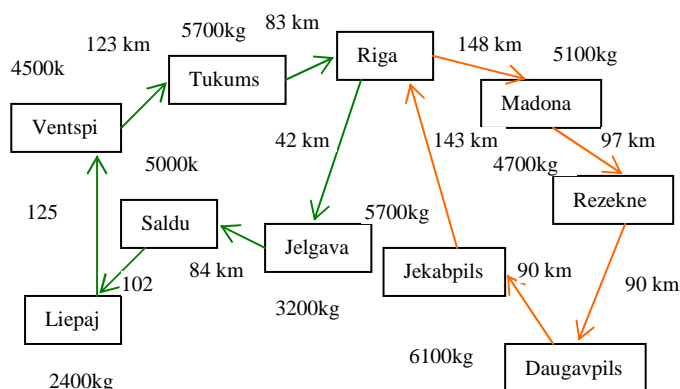


Fig. 4. The Final Optimal Routes

Here each unit of km equals to a certain unit of costs. Transport costs of the company consist of driver salary, transport unit depreciation, cost of fuel, taxes, administration costs and others. So using the optimal route for cargoes deliveries the distribution company (Logistic Company) could minimize the transport costs and improve the effect of transport use.

#### IV. CONCLUSION

During developing time of the Logistic centre activity any logistic company faces the list of the barriers and some specific problems. Working strategy for Logistic centre successful development defines the solving process of some specific tasks. In this article the typical strategic tasks for the Logistic centre successful development were observed and confirmed by samples.

Considered decisions and right strategy allow to decrease the costs as it shown in this paper on the concrete example of creating the circular delivery route for goods distribution from Logistic centre to its final customers in Latvia.

#### Olga Girvica. Mūsdienīgas stratēģijas loģistikas centra izdevumu optimizācijai

Pēdējos gados pasaules transporta sistēmā ir notikušas izmaiņas, tādas kā pirkšana un pārņemšana vai saplūšana, kas savukārt izraisīja izmaiņas transporta biznesā. Loģistika un piegādes tīklu vadība - šodien tie ir svarīgi biznesa instrumenti. Loģistikai ir galvenā loma gala patērētāju vajadzību apmierināšanai, nodrošinot pakalpojumus ar piegādes sistēmas organizācijas palīdzību, risinot vadības uzdevumus īstermiņa un vidēju termiņu perspektīvā un stratēģiskos plānus ilgtermiņa perspektīvā. Jaunās piegādes sistēmas organizācijas idejas pamatā ir vienkāršota piegādātāju ķēde, līdz minimumam samazināts glabāšanas laiks un apjoms, kā arī maksimāls piegādes ātrums un efektivitāte. Loģistikas centra veiksmīgu attīstību nosaka virkne specifisku uzdevumu, kuri šajā rakstā doti ar konkrētiem piemēriem: sistēmas radīšana preču pieņemšanai noliktavā; kravu šķirošana; nepieciešamās preču glabāšanas sistēmas radīšana; kravu kustības kontrole un izsekošana caur noliktavu; preču sadales (distribūcijas) un piegādes galīgajam patērētājam organizēšana; iespēju un piegādes procesa apvienošana, lai labāk atklātu un atbalstītu klienta mērķus. Kā rāda konkrēts piemērs ar aplūkota piegādes maršruta radīšanu, labi aprēķināti risinājumi dod iespēju samazināt loģistikas centra izdevumus. Loģistikas ieguldījums konkurētspējā un preces vērtības radīšanā ir primārais uzdevums mūsdienu tirgū.

#### Ольга Гирвица. Современные стратегии оптимизации расходов логистического центра

В последние годы мировая транспортная система проходила через определенные изменения такие как приобретение и поглощение или слияние, что в свою очередь вызвало изменения в транспортном бизнесе. Логистика и управление сетью поставок стали сегодня одними из ключевых предметов для бизнеса. Логистика играет основную роль в обеспечении услуг удовлетворяющих нужды конечных потребителей через организацию системы поставок в рамках решения управленческих задач в краткосрочной и среднесрочной перспективе и стратегических планов в долгосрочной перспективе. В основе идеи организации новой системы поставок лежит упрощенная цель поставщиков, уменьшенное или сведенное к минимуму время и объем хранения и максимизированная скорость и эффективность доставки. Для успешного развития логистического центра существует ряд специфических задач, представленных в данной статье с конкретными примерами: создание системы приемки товаров на склад; разборка и сортировка грузов; создание необходимой системы хранения товаров; обеспечение контроля за товарами на складе; контроль и отслеживание движения грузов через склад; организация распределения (дистрибуции) и дальнейшей доставки товаров конечному потребителю; объединение вместе возможностей и процесса доставки для лучшего раскрытия и поддержки целей клиента. Как показывает конкретный пример по созданию кругового маршрута доставки, хорошо просчитанные решения позволяют снизить расходы логистического центра. Вклад логистики в конкурентоспособность и создание ценности товара является первоначальной задачей на современном рынке.

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Olga Girvica has 14 years of working experience in logistics field. From the year 1995 has been working in the transport area connecting to the different transport types (road transport, railway, containership, air cargoes deliveries) specialized in multimodal deliveries for various cargoes. From 2006 took the position of Managing Director in Logistics Centre of the company "66 North Delivery & Logistics" the part of the International Group of "66 North" brand, textile goods sales and production company.