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FORMING OF LOGISTICAL SYSTEM OF ORGANIZATION OF FREIGHT TRANSPORTATIONS IN MEGAPOLISES

Summary. The questions of forming of the logistical system of organization of freight transportations in megapolises on terminal technology are considered. Solution of task of choice of optimum location of distributive centre and decreasing of total expenditures on delivery of freight is offered.

ФОРМИРОВАНИЕ ЛОГИСТИЧЕСКОЙ СИСТЕМЫ ОРГАНИЗАЦИИ ГРУЗОВЫХ ПЕРЕВОЗОК В МЕГАПОЛИСИХ

Аннотация. Рассмотрены вопросы формирования логистической системы организации грузовых перевозок в мегаполисе по терминальной технологии. Предложено решение задачи выбора оптимального местоположения распределительного центра и снижения суммарных затрат на доставку груза.

1. PROBLEMS OF CITY LOGISTICS

The end of XX and the beginning of XXI ages is the period of rapid development of production and computer technologies. This growth affected the deep change of consumer and economic conduct of society, and as a result the importance of the municipal transport systems as the channels of distribution and sale of vital important goods and services had been increased. Such field of science as city logistics is engaged in the problems of the municipal transport system. The logistics of distributing and sale in the commodity-conducting networks of a retail and small sale trade in large-scale megapolises was the initiator of development of city logistics [1-4].

On today the big shopping centers are built on outskirts of large cities, that allow to provide more qualitative level of maintenance of buyers (big commercial areas, wide range of goods, comfortable transport communication). They use correctly put right and well working system of logistics as a reliable tool for achievement of competitiveness. Also today, the electronic kinds of purchases are becoming more popular, but, in spite of all that the problem of deliveries, as well as and transport problem is actual until now. The decision of transport problems must be advantageously to all participants in the chain of deliveries: producer - buyer (shopping centre) – city.

Retail trade business in Ukraine is one of branches, which has the high rate of development. According to data of the State Statistical Committee the volume of turn of retail business of Ukraine on 2008 made a 449,3 billion of UAH, that in price comparison on 20% are higher than volume of 2007 [5].

The analysts forecast that during the nearest two years in Ukraine there will be the growth of sector of retail trade business. It sure will cause the yet greater increase of elemental markets in the streets of city, in connection with aspiration of population to reduction of own transport expenses on acquisition of commodities for an eventual ordinary user, especially in the conditions of crisis.

In opinion of scientists, the expenses on delivery of commodities make near 25% from the suggested retail price [3], therefore the problem of reduction of expenses on transporting to the trade networks must be decided immediately.(Reduction of logistical expenses on 6-10% will allow to multiply the profit of commercial enterprise to 50%). For example, the basic flow of the imported commodities in Ukraine is on seaports: Odessa-port, Ilichevsk, Mariupol, Nikolaevsk and Izmail-port-port and then is redistributed on shopping centers, which are located in different corners of Ukraine, that causes the increase of commodity traffic on transport corridors. Existent problem of increase of efficiency of distributing of freight traffics and reduction of transport overloading of streets of cities is very actual. The overloading results in traffic-jams and stop of street traffic, especially in central downtown (for example,, in Kharkov the incoming freight flows make. 27957 cars from 8 to 10 a.m., and 21247 cars come out [6]).It is obvious that the given problem can be solved by co-ordination of processes of delivery and distributing of freights within the city boundaries and outside its bounds.

The choice of logistical strategy is the key aspect of development of retail trade network.

The main directions of reduction of expenses of commodity traffic in the retail trade business [7]:
1. Integration of all elements of chain of deliveries.
2. Autosorsing (concentration of all resources on that type of activity, which is basic for an enterprise, and transmission of the other functions to the reliable partners.).
3. Use of distributive centers.
4. Categorical management.
5. Use of the informative systems.

Networking of freight terminals around city agglomerations, closing a city from the entrance of heavy transport vehicles and executing the functions of transport-distributive logistical centers, providing the commercial and socio-economic effectiveness presents a very important and actual task.

2. MODERN TECHNOLOGIES OF DELIVERY OF FREIGHTS

One of modern technologies of delivery of freights is the terminal technology [6] (fig.1). Terminals are the basic links of transport operating servicing at international and interurban transportations .One transport network is closed and other begins on territory of the terminal complex. The modern terminal complex has not only ware house but also functional subdivisions for accumulation of freights, storages of commodities in expectation of dispatch are located in it. The terminals also offer the complex of services of expeditionary maintenance.

On today, conducted by many authors the analysis and evaluation of the state of freight traffic in agglomerations, allowed to define a steady necessity in freight-processing and freight-accumulation on terminals both in clearly motor-car transportations, and multimodal, with participation of various types of transport.

The analysis of work of freight-processing enterprises and storages had shown that, in spite of large number of enterprises and firms of this profile, dispersed on all territory of municipal formation and after its bounds, the overwhelming majority from them had small ware-house areas, extremely small on capacity of freight-processing (from 30 to 150 tons daily).In addition, they are badly equipped, do not use modern technologies, had the insufficient level of quality and complexity of provided services. All this conduces to dispersion of investments, to the inefficient use of the landed resources and basic funds, complicates and sometimes restrains the development of barter and commodity circulation. In addition, the problems of city in regard to limitation of entrance of heavy motor transport in the city boundaries, reduction of intensity of freight traffic and improvement of ecological situation in town are not solved to a full degree.

The terminal technology of delivery of freights

Delivery-export of freights

Main-line transportations

Processing of freights on terminal

Distance at delivery-export operations

Volumes of dispatching

Distance of inter-terminal delivery

Volumes of united parties of freights

Routes of transportations at delivery and export

Routes of main-line transportations

Network of terminals

Equipment of terminal

Expenses on delivery and export

Expenses on main-line transportations

Expenses on capital outlay

Current expenses on terminal

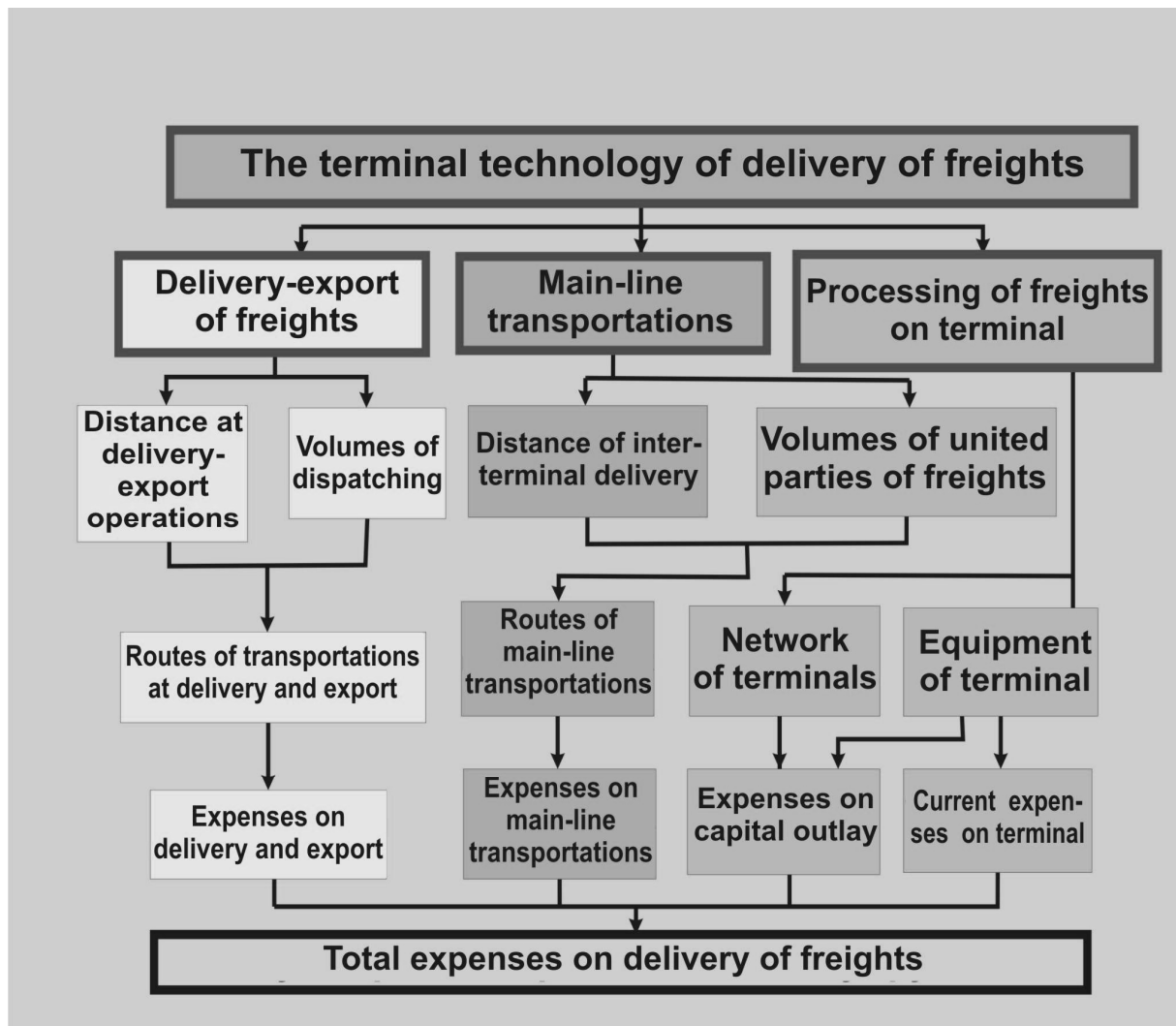## Total expenses on delivery of freights

Fig. 1. Modern technologies of delivery of freights
Рис. 1. Современные технологии доставки грузов

Thus, the necessity of creation of the distributive centers on the basis of multimodal freight terminals [7] comes to light. In such centers different products of machine-building, power, electronic, chemical, pharmaceutical, textile and other industries will get unloaded, be kept and be freighted expecting the redistribution on storages and enterprises of city or region. Storing of commodities on terminal ware-houses and then transportation on city objects must be carried out by the most simple and rapid way (by the cars of small and middle freight-carrying capacity).

Everywhere in world the multimodal freight terminals (fig. 2-3), located near main cities, are in the first turn intended for distributing into these cities, and in the second turn, for an accumulation of supplies which in future are sent in other regions or on the export.

The distributive centers are created in the case of delivery of multi-nomenclature products within the framework of logistical chain. Creation of such distributive centers allows to exclude building of store-houses at the producers, to form the flows of products into transport parties — through carriages or container dispatches. The purpose of creation of the distributive centers is acceleration of delivery of freights to the recipient, reduction of duration of accumulation and storing of freights of transport party with a maximal effect on the basis of the use of logistical methods.

Fig. 2. Ground systems of distributive centers on the basis of multimodal freight terminals
Рис. 2. Наземные системы распределительных центров на основе мультимодальных грузовых
       терминалов

Fig. 3. Water-way systems of distributive centers on the basis of multimodal freight terminals
Рис. 3. Водные системы распределительных центров на основе мультимодальных грузовых терминалов

It is advantageous at first to transport freights in a distributive centre, and then after forming of dispatch to deliver them to the product recipient, if the economy of time is achieved on all route of the running of the freight and its delivery is provided «exactly in time» at the optimum use of hardware components of all types of transport.

Perfection of the system of transport maintenance of terminal complexes depends upon a number of important problems: choice of rolling stock, preparations of skilled personnel, rhythmical pace of deliveries in realization of the mixed transportations in which the delivery of commodities is carried out on conception «from a door to the door», using in this case more than one type of transport. The change of market of the transport, oriented to demand of clients, means that not only the whole type of transport is important, but the high-quality transportation, offered to both the consigner and consignee. The method of transportation of freights in containers is one of qualitative transportation methods.

Advantage of container transportations consists of possibility to provide high safety and preservation at delivery of freight from the consigner to the consignee. Packaged in a container the freight is better preserved. Exactly at the load transfer the freights are frequently exposed to the risk of spoilage, breakage, theft and etc. Use of standard containers supposes standardization of transport vehicles, hard-ware components and lifting-and-conveying machines, which are designed and manufactured taking into account the application of such containers.

However with the participation of the distributive centre the additional expenses related to processing and accumulation of freights on transport party appear in maintenance of channels of freight traffics. It is necessary to mean that considerable investments are required on creation of the distributive centers, and on their servicing — substantial operating costs. At creation and use of the distributive centers as the regulators of freight traffics there is the row of problems which require the solution of many methodical tasks.

3. MODELLING OF LOCATION OF DISTRIBUTIVE CENTRE

At creation of distributive centre it is necessary to solve the tasks of choice of optimum site of distributive centre and reduction of total expenses of delivery of freights.

The method of a «trial point» [8] can be used as one of methods of choice of such centre location.

Determining of rational site of distributive centre in the region of its maintenance and sale of commodities depends on many factors, including: the sizes of the region, geography of the mutual placing on its territory of users, volumes of their commodities flows, and the set frequency of deliveries of commodities, density and special features of local road network. As a rule, at a plenty of consumers this task is solved on powerful computers with an exhaustive search and evaluation of numerous variants. However, it is possible to solve the task with an admissible probability by the heuristic methods based on experience and intuition. Using these methods, the irrational inefficient variants are cast aside notoriously, and an optimum variant which is represented on the example of transport city network of rectangular configuration is selected from remaining alternatives. In the nodes of the network A, B, C, D there are consumers with the indication of monthly volume of delivery of commodities in tons. It is necessary to locate the distributive centre E on the areas of network so that transport expenses on delivery were minimum.

We will determine as a trial point any point which is found on the area section of maintenance of network, but not belonging to its ends. The search of optimum location of distributive centre by the transferring of the trial point must proceed until the total volume of delivery to the users from the left of the point will not exceed the total volume of delivery to the users from its right party and then the decision about placing of distributive centre is made [9].

We will consider a variant, when the total volumes of deliveries on the left and on the right from the trial point of a next segment are equal. To determine by the stated method the knot of transport network of rectangular configuration optimum for placing of distributive centre it is necessary to plot the coordinate axes orientated parallel to the roads on the map of region. Assigning the proper values of volumes of deliveries to the ordinates and abscissas of users it is necessary to find the optimum

location of distributive centre on every coordinate axis by the same method. This will be crossing marked on the fig. 4 (the E point).

The final decision on the place of location of the distributive centre is taken after the analysis of possible sections of placing in the vicinities of the found optimum. Thus it is necessary to take into account the transport availability of locality, dimensions and configuration of the area offered under the centre storages, and also plans of local authorities in regard to the selected territory, questions of safety and transporting conditions of freights.

The reduction of total expenses on delivery of freights is assumed to carry out due to perfection of technological operation of transport-power complex. For example, for automobile transport it means to multiply the coefficient of increase of carrying capacity and coefficient of the use of run.
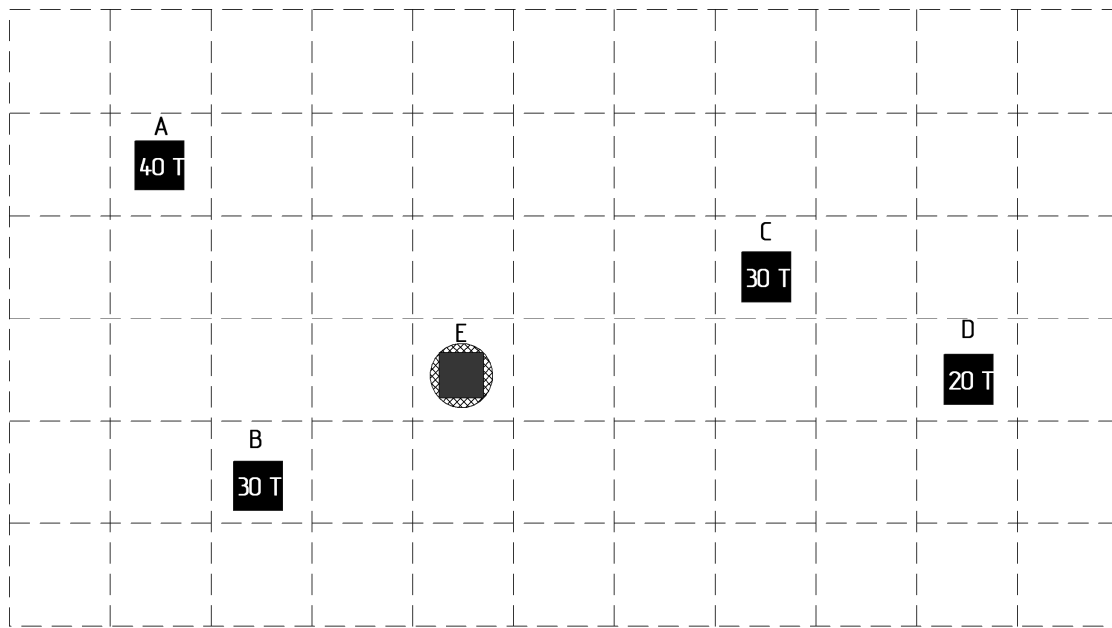

Fig. 4. Choice of the site of transport-distributive logistical centre
Рис. 4. Выбор местоположения транспортно-распределительного логистического центра

4. CONCLUSIONS

1. The choice of optimum technologies of delivery of freights and site of distributive centre will result in reduction of logistical expenses, that will allow to increase the profits of trade enterprise.

2. To reduce the tariffs of delivery of freights it is necessary to perfect technological operation of transport-power complex.

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