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# USSR Report

TRANSPORTATION

(FOUO 4/80)

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USSR REPORT

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RAILROAD

ADVANTAGES OF PACKAGING LOOSE COMMODITIES

Moscow VOPROSY EKONOMIKI in Russian No 7, Jul 80 pp 50-59

/Article by P. Yakovlev: "Transport and Warehouse Integration and the Turnover of Means of Production"/

/Text/ The achievement of the best interaction of the processes of storing and moving products for production purposes is becoming an effective means of expediting their economic turnover. At present the need to examine these processes as a set is more and more obvious.

The reduction of the expenditures of the total time of the storage and movement of means of production should be based on the consideration of the conditions of delivery and the peculiarities of the types of cargo (bulk, liquid, individually packaged). In rail transport, which continues to play a leading role in freight traffic, bulk and liquid cargo makes up four-fifths of the hauled amount of cargo, including coal and coke--more than 20 percent, petroleum cargo--in excess of 10 percent, ore--about 9 percent and so on. These types of cargo as the most massive ones require the use of such a reserve for shortening the transportation time of the means of production as the establishment of efficient routes of their movement from the point of production (extraction) to the point of consumption. The handling of bulk and liquid cargo is notable for a high level of mechanization of the loading and unloading operations, which, as a rule, reaches 90-100 percent. Individually packaged freight, while taking up a less significant proportion in the freight traffic, is characterized by a high labor-intensity of handling. For it the increase of the technical equipment of loading and unloading operations is the main reserve for shortening the hauling time of products for production purposes.

The improvement of the turnover of the means of production by improving the pattern of economic ties, which act simultaneously as transport ties, is based on the optimization of the attachment by supply and sales organization of the consumers of means of production to suppliers and is an important transportation economics problem.

Its successful solution to a considerable extent depends on the cooperation of the transport and the supply and sales links of the national economy. In

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particular, they elaborate and introduce so-called diagrams of normal freight traffic, in conformity with which the hauling of 75 percent of the total amount of cargo is presently envisaged by rail. The joint rationalization of the transportation of freight by rail made it possible to decrease relatively its freight turnover during the Ninth Five-Year Plan by 130 billion ton-kilometers.

In 1978 the railroads in conformity with the diagrams of normal freight traffic eliminated from the plans of consigners about 20 million tons of irrational shipments, while the joint measures of USSR Gosplan, the USSR State Committee for Material and Technical Supply and the USSR Ministry of Railways in 1978 made it possible to reduce rail shipments by more than 35 billion ton-kilometers.

According to the data of the Institute of Complex Transportation Problems attached to USSR Gosplan, 25 percent of all the irrational shipments of ferrous metals are caused by shortcomings in the placing of orders and the attachment of consumers to suppliers. This enhances the role of supply and sales units in the organization of freight traffic, in the improvement of which there are considerable reserves.

The shortening of the average distance of shipments is a substantial reserve for expediting the economic turnover of means of production. At present the reshipments of coal, which are connected with its concentration, have reached significant volumes. Their amount annually exceeds 110 million tons. At present 20 million tons of iron ore are shipped over a distance of more than 2,000 km. Due to cross and long hauls of conversion metal every ton of ferrous metals is hauled by rail transport on the average 1.6 times. The irrational shipments of timber cargo make up over 10 billion ton-kilometers and those of cement, some construction materials and reinforced concrete items make up about 10 billion ton-kilometers. All this slows the turnover of means of production, by increasing the hauling time of freight.

Central supply and sales organizations are taking part in the improvement of the freight flow of products for production purposes. Thus, 40 percent more rolling stock is required for the hauling of round timber than for the hauling of the same amount of lumber. Meanwhile, in Siberia and the Far East the production of lumber, splint-slab and wood-fiber board is not being ensured in the necessary amounts. The USSR State Committee for Material and Technical Supply jointly with USSR Gosplan has substantiated the proposals on the construction in the eastern regions of the country of seven new sawmills, the increase of the amounts of sawmill operation and the reduction of the shipment of unprocessed timber.

At the same time in the formation of a rational pattern of the freight flow in transport the supply and sales organizations for the present are still not fully utilizing their potentials. As a rule, 80-90 percent of the measures on improving shipments, which are approved by Gosplan and the State Committee for Material and Technical Supply, are based on proposals of the transportation ministries and departments.

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In this connection the experience of creating councils for the coordination of the operation of transport in the republics and at major industrial centers with the participation of regional supply and sales organizations merits attention. Such councils increase the cooperation of transport and material and technical supply in questions of rationalizing freight traffic.

Joint measures on the routing of traffic, which considerably shorten the hauling time of freight, are also conducive to the improvement of the cooperation of transport and material and technical supply. For example, in the organizations of the USSR State Committee for Material and Technical Supply when hauling petroleum products plans of the routes are worked out monthly jointly with the administrations of the railroads and the petroleum refineries. This is necessary especially as the planning of the shipment of freight by rail transport routes should take into account the capacities of the cargo areas of the consignees. For the proportion of the consignor routes on general-purpose railroads on the whole increased in 1978 to 45.5 percent, while for raw material freight the level of traffic routing is even higher (for example, for petroleum and petroleum products it is 78.2 percent). However, the very subdivisions of material and technical supply, as well as of agricultural procurement were still inadequately prepared for the delivery of freight by unit trains. The USSR State Committee for Material and Technical Supply does not have at present large lumber bases, the majority of grain receiving stations have been adapted to receive grain only from one or a few cars, routes of trucks, agricultural machinery and a number of other loads are not being used.

To increase the effectiveness of the joint work of transport and material and technical supply it is necessary for the handling of freight traffic, including the transfer of freight from one type of transport to another, to be carried out with allowance made for the centralized delivery of small-batch products to the consumer of a given region according to a coordinated schedule. Such a method of delivery reduces the amount of motor transport which operates for hauling freight from warehouse facilities, improves the utilization of its carrying capacity, makes it possible to deliver products directly by the time of their putting into production and by means of the reduction of the production stocks of enterprises decreases the total stocks of means of production in the region.

During the 10th Five-Year Plan the level of the centralized delivery of products for production purposes by motor transport in the organizations of the USSR State Committee for Material and Technical Supply and the USSR State Committee for the Supply of Production Equipment for Agriculture was more than 80 percent. However, the main difficulties consist in the fact that the fleet of trucks for centralized delivery is inadequately efficient and is not completely suited for loading and unloading operations with long, fragile and several other types of products. Therefore small and medium-sized specialized and heavy trucks, interchangeable bodies, trailers and semitrailers should be extensively developed.

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Warehouse supply covers products which are received in small lots. The volume of small-lot shipments, which should be performed by medium-sized and even heavy trucks, as well as with the use of trailers, by organizing the delivery along circular routes with stops at several addresses, at this time is increasing. Interurban hauls by general-purpose motor transport are a large reserve for the development of the delivery of products from supply bases.

During the Ninth Five-Year Plan a major transport service was created by the subdivisions of material and technical supply of agriculture by means of the concentration of some of the vehicles employed in agricultural production. During this period the truck fleet in the organizations of Sel'khoztekhnika increased twofold. The concentration of the fleet increased by nearly one-fourth the labor productivity in transport operations. In 1978 the volume of operations of the transport enterprises of Sel'khoztekhnika was equal to 2.4 billion rubles.

Taking into account that the consumers served by the organizations of statewide supply are using common carrier more extensively, the volume of delivery by their own motor transport here is considerably less. In 1976 with the use of this type of services 36.5 million tons of freight were delivered from the bases, warehouses and stores of the organizations of the USSR State Committee for Material and Technical Supply.

The development of services in the sphere of the circulation of the means of production, including centralized freight delivery, is largely governed by the condition of the warehousing services and by their technical equipment. Thus, in recent years in the subdivisions of Sel'khoztekhnika a number of major warehouse facilities for mineral fertilizers<sup>1</sup> have been built, which are equipped with highly productive equipment for the mechanization of loading and unloading operations, including special machinery for unloading mineral fertilizers from cars (in 1978 there were already about 3,000 such machines at the warehouses of Sel'khoztekhnika).

In the sphere of circulation the intensive construction of mineral fertilizer warehouses has been under way only since the mid-1960's. At present there are mineral fertilizer storehouses with a capacity of about 10 million tons in the Sel'khoztekhnika system. However, many of them are intended for the storage of fertilizers in packaging and do not make it possible to use specialized transport effectively. There is approximately the same total capacity of mineral fertilizer warehouses at kolkhozes and

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1. These complexes, which are now a part of the All-Union Soyuzsel'khozkhimiya Association, could become agrochemical centers, which would also take upon themselves the application of fertilizers to the soil without their sale to the farms. Such a procedure would promote their mutual interests and would considerably reduce the losses of fertilizers during their storage and transportation.

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sovkhozes, but to a considerable extent these warehouses are little suited buildings, which often are not appropriate for the storage and mechanized handling of fertilizers.

An important factor of the improvement of the turnover of products for production purposes is the integration of the equipment which serves the movement of goods from the producer to the consumer, therefore it is inadvisable to regard the technology of materials-handling, loading and unloading and warehousing operations in isolation. The mechanization, and then the automation of each of the indicated operations require that equipment of them, in case of which the maximum standardization, unification of the equipment, which organizes the commodity flow of products for production purposes, would be achieved. Transport packaging, pallets and containers, which are produced with allowance made for standardization, have become the base, which has made it possible to coordinate their parameters with the dimensions of the working surfaces of vehicles, warehouse facilities and the means of mechanization of materials-handling, loading and unloading and warehousing operations. The bundle, parcel, package and container are a standardized sequence of freight units. Their appearance is leading to the typification of freight traffic, materials-handling, loading and unloading and warehousing operations, means of mechanization and automation. The rationalization of the freight flow or means of production requires that it be regarded jointly with the means of hauling and storage as a unified object of management and planning, as a transportation and warehouse complex, which includes the vehicles, warehouses, packaging, materials-handling equipment and other equipment for loading and unloading and warehousing operations.

Since the warehousing services of industry, construction, transportation and material and technical supply are interconnected by the freight flow, the integration of the equipment involved in the process of storage and hauling creates the prerequisites for the assurance of the complex mechanization and automation of materials-handling, loading and unloading and warehousing operations over the entire route of the movement of freight.

From this there follows: first, the need for the purposes of increasing the efficiency of transportation and warehousing processes to intensify container and package shipments as the most highly productive shipments, which afford an opportunity to introduce the complete mechanization of materials-handling, loading and unloading and warehousing operations at the producer, the transportation organization and the consumer; second, the urgency of the reequipment of warehousing facilities, since only the one-time and proportionate supply of advanced means of the mechanization of materials-handling, loading and unloading and warehousing operations to all the links along the path of the movement of freight to the consumer will provide the national economy with the greatest economic impact.

So far it is still difficult to call the methods of carrying out materials-handling, loading and unloading and warehousing operations completely industrial methods, which conform to the level of basic production. To this

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time the crane equipment in the technology of materials-handling, loading and unloading and warehousing operations has been the most prevalent materials-handling equipment. But too few modern cranes, which conform to the best foreign and domestic models, are being used. This pertains first of all to the use in materials-handling, loading and unloading and warehousing operations of gantry and overhead cranes, which are equipped with hoisting mechanisms, self-propelled gib cranes with a greater lifting capacity for work on open yards, stacker cranes for the equipment of tall warehouses with them and so on.

The proportion of loaders, which do not conform to the present technical level, is large in the fleet of railless ground-type transport. As compared with the best foreign machines they have a smaller lifting capacity, a lower rate of travel, as well as movement of the drive elements, they do not have the necessary set of interchangeable hoisting mechanisms, they have a greater curb weight, turning radius and so on. Moreover, at the warehouses there are still not enough of many advanced types of equipment for the performance of materials-handling, loading and unloading and warehousing operations, in particular, such types as automatic hoisting devices, warehouse equipment, standard packaging and others.

The need for equipment for the handling of individually packaged freight, such as storage racks, pallets and containers, without which it is difficult to achieve a radical change in the technology of materials-handling, loading and unloading and warehousing operations, is not being met rapidly enough. The handling of individually packaged cargo, in contrast to liquid and bulk cargo, is especially labor-consuming. In the total expenditures on the performance of loading and unloading and warehousing operations the outlays for the handling of individually packaged cargo take up 75-80 percent. The proportion of this cargo in the total freight turnover is estimated at 20-25 percent, but its loading and unloading account for 50 percent of those employed in materials-handling, loading and unloading and warehousing operations. There are great reserves in the improvement of the technology of the processes of handling individually packaged cargo.

The development of package and container shipments of individually packaged cargo is transforming the technology of materials-handling, loading and unloading and warehousing operations, is increasing the capacity of cargo areas, is shortening the layovers of rolling stock for loading and unloading and is speeding up the travel time.

On the whole by the start of the 10th Five-Year Plan 55 million tons of freight were hauled in containers, 170 million tons (primarily lumber, construction materials, rolled ferrous metal products, pipe) were hauled in packages, of them 25 million tons were individually packaged freight.

More than 1 million general-purpose containers, for the hauling of which general-purpose rolling stock is used and specialized rolling stock for transporting medium-weight and heavy containers is being built, are in use in the national economy.

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In 1977 36.1 million tons of freight were shipped in containers on the railroads (as against 26.4 million tons in 1970 and 35.4 million tons in 1975), while the freight turnover of the container fleet increased to 70.5 billion ton-kilometers (as against 41.4 billion ton-kilometers in 1970 and 65.6 billion ton-kilometers in 1975). By the end of the 10th Five-Year Plan almost the entire medium-weight and heavy fleet will consist of metal containers.

The national economic efficiency of container shipments, according to the data of the USSR Ministry of Railways, is governed by the fact that the transportation costs when delivering individually packaged cargo by containers as compared with their shipment in pool cars are reduced by approximately 20-22 million rubles per 1 million tons of cargo, including by 16-18 million rubles by the reduction of the expenditures on packaging and packing and by approximately 4 million rubles as a result of the decrease of the operating expenses of the railroads (in 1978 the cost of shipments of individually packaged freight in containers and boxcars was respectively 5.7 and 8.9 kopecks per 10 ton-kilometers). Here approximately 1,500 people, who are engaged in heavy manual work in transportation, and up to 4,000 people, who are engaged in the production and repair of packaging, packing and so forth in industry, are released for every million tons of freight.

Methods of transporting metal products using specialized cars and containers are being developed. Thus, it is feasible to transport 65 percent of the cold-rolled sheet by specialized cars and 20 percent by specialized containers. Here the appraisal of the preferability of the use of a 10-ton or a 20-ton specialized container is made according to the cost of the use of 1 m<sup>2</sup> of its area when similar type sizes of rolled products are being loaded (the minimum cost of the use of 1 m<sup>2</sup> of the area of containers is 86 rubles/m<sup>2</sup>). If the consumers are located more than 500 km from the supplier, it is more efficient to use in the case of small shipments (up to 1,000 tons a year) disposable packaging.

A sheet-carrying car, which makes it possible to shorten the time of loading and unloading operations from 2.5-3 hours to 10-15 minutes, has been developed for the hauling of large sheet steel. The annual economic impact from the use of the sheet carrier for hauling the products of the Azovstal' Plant is 200,000 rubles.

It is advisable to ship small-diameter pipe, small- and medium-section rolled products and some sheet steel in packets using disposable packaging, hardware in packs and boxes and rolls of steel on pallets. Primarily large-diameter pipe, plate and large-section steel (50 percent of the section and sheet rolled metal and 40 percent of the steel pipe) are now delivered without packaging.

On the whole the process of packing and containerizing products is not proceeding rapidly enough. The development of package shipments is being checked by the fact that most consignors lack means of machine packaging, the production of which still lags considerably behind the demand. The

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structure of the container fleet in general-purpose transportation is irrational. At present 80 percent of the fleet is made up of small (up to 3 tons) containers, while in conformity with the pattern of the freight flow it should have 45 percent containers up to 3 tons, 25 percent--up to 5 tons and 30 percent--over 10 tons. There are not enough large and specialized, particularly flexible, containers in circulation. At present package and container shipments take up approximately one-third of the freight, which it is advisable to deliver in packets and containers.

An effective structural policy in the sphere of circulation should ensure both progress in the means of delivery and the simultaneous balanced development of the cargo areas at warehouse facilities. Unfortunately, far from all the warehouse facilities of industry, transportation and material and technical supply, including the general-purpose warehouse facilities, which have been newly put into operation, are ready for the complete mechanized handling of large containers.

On the route of products for production purposes from the producer to the consumer, as materials-handling, loading and unloading and warehousing operations are saturated with means of mechanization, the warehouses to a considerable extent become the organizing unit of the freight traffic. At warehouse facilities first of all the technological comparability of the materials-handling equipment, the transportation equipment and the warehouse equipment is required, for which the latter should be regarded as components of a unified system, which would correspond not only with each other, but also with the pattern of the freight flow and first of all with the structure of the freight units of individually packaged products.

In this connection, in addition to containers and packets, modern transportation packaging is assuming great importance as a means of the mechanization of materials-handling, loading and unloading and warehousing operations. Such packaging is a necessary component of the advanced technology of loading and unloading, transportation and warehousing operations. Forming a consolidated or independent freight unit, which has been unified on the basis of a standard module, it creates the basis for the standardization of the processes of moving freight, being combined in the best manner with the parameters of the drive elements of materials-handling and warehousing equipment and the working surfaces of the means of transportation. Here the improvement of the use of the rolling stock and the acceleration of the freight turnover are achieved. Modern transportation packaging for the shipment of products for industrial engineering purposes is an important infrastructural component, which is capable of having a substantial influence on the improvement of the turnover of means of production (at the beginning of the 10th Five-Year Plan one-third of the transportation packaging was used for the shipment of products for production purposes).

Loading, unloading and warehousing operations predominate at warehouses, therefore the unitizing of materials-handling equipment with the hoisting mechanisms, with the storage racks, pallets and other equipment on the basis of the complete standardization and unification of the methods of

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handling the freight, the technology of the processes and the systems of mechanization will have an appreciable influence on the technology of materials-handling, loading and unloading and warehousing operations. The reequipment and modernization of warehousing services, the placement of modern warehouse complexes into operation, including in the sphere of the circulation of means of production, should promote the unification of technological processes and the introduction of highly productive equipment.

During the 10th Five-Year Plan large supply and sales complexes are being built at industrial centers to strengthen the material and technical base of warehouse supply. The warehousing services of the eastern regions of the country are being developed rapidly. Thus, of the total amount of warehouse area put into operation during the Ninth Five-Year Plan remote regions account for 31 percent, during the 10th Five-Year Plan--42 percent. By the end of the 10th Five-Year Plan the capacities of the statewide supply bases and warehouses will have increased from 44.5 million tons in 1970 and 51 million tons in 1975 to 65 million tons in 1980, the warehouse area for enclosed warehouses--from 3.1 million m<sup>2</sup> and 4.5 million m<sup>2</sup> to 7 million m<sup>2</sup>. It is necessary to examine this development of the warehouse network, which serves the intersectorial indirect turnover, together with the directions of the development of the departmental supply and sales network.

The problem is that the statewide supply system owns only one-fourth of the fixed capital for supply and sales purposes (excluding petroleum supply), a fourth of the warehouse areas, which belong to the sector of material and technical supply. This requires first of all the coordination of the national economic, sectorial and regional programs of the construction of modern warehouse facilities for supply and sales purposes in order to properly locate them in accordance with uniform criteria at industrial centers and territorial production complexes, to choose soundly the specialization and capacity of the bases and warehouses, as well as to pursue a progressive technical policy in the area of materials-handling, loading and unloading and warehousing operations.

The correlation of the investments in the new construction and renovation, on the one hand, of the warehouse facilities of supply and sales organizations and, on the other, the warehousing services of enterprises is an important problem from the standpoint of the construction of the warehouse network. At present the fixed capital in the warehousing services of all the sectors of the national economy is valued at approximately 50-55 billion rubles, of which only slightly more than 15 percent belongs to the sector of material and technical supply, while the remainder is a part of the productive capital of industrial, construction and transportation enterprises. These proportions are a consequence of the tradition of the "natural economy" of the absolute majority of enterprises, as well as of the fact that in regions of new construction, and not only new construction, the usual practice is the dispersal, and therefore the increase of the production stocks of material and technical resources among numerous small facilities of the warehouse network of construction subdivisions. The

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supply of construction projects in accordance with their orders directly from statewide supply bases and warehouses is conducive to the shortening of product storage time.

The sources of the "natural economy" must also be sought in the sphere of supply and sales processes. The preservation of the traditions of the "natural economy" in many ways is explained by the low level of production cooperation, the inadequate reliability and efficiency of supply and the operation of the transportation conveyor, which leads to the violation of the optimum ratio of investments in the warehouse facilities of enterprises and supply and sales organizations.

The problem of developing the warehousing services of an enterprise is a complex one. And it can be solved not only within the framework of the alternative: either to develop rapidly the warehousing services of enterprises, or the warehouse network of supply and sales organizations, but by searching for the most feasible supply system for this case. Here the preferability in all instances of the system of the State Committee for Material and Technical Supply would hardly correspond to the diversity of the specific conditions of production or construction activity at an industrial center or territorial production complex. Thus, if the amounts of industrial construction in a region are sufficiently stable and correspond to the turnover of goods and freight of a large warehouse facility, it makes no basic difference whether this facility is in the system of a supply and sales organization of a construction ministry or statewide supply. The main thing in increasing the effectiveness of the expenditures on the creation and functioning of warehousing services is to invest capital in the construction of modern warehouse complexes, which are equipped with advanced means of labor with allowance made for the properties of the commodity flow of products for industrial engineering purposes and its provision with transportation, the advanced technology of materials-handling, loading and unloading and warehousing operations.<sup>2</sup>

With the further improvement of the organization of the commodity flows of industrial products for production purposes the opportunities for the re-equipment of the sphere of material and technical supply increase substantially.

The intensive saturation of this sphere with means of labor, which ensure the improvement of the use of the volumes of the available network of warehouse facilities primarily by means of increasing the height of storage

2. Specialists recommend that the construction process begin with the laying of roads. To this it is also possible to add the suggestion that the construction of production facilities begin with the erection of warehouse facilities, not temporary ones, but permanent ones, which are envisaged by the plan of the facility being erected, so that after its placement into operation the warehouses would be changed over from the storage of construction materials and equipment to the storage of raw materials (materials) and finished products.

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took place during the Eighth and Ninth Five-Year Plans. Thus, during the Ninth Five-Year Plan at the bases and warehouses of the USSR State Committee for Material and Technical Supply the introduction of advanced warehouse technology and means of mechanization on 3.3 million m<sup>2</sup> of operating warehouse areas made it possible to obtain an impact equal to the placement into operation of 1 million m<sup>2</sup> of new areas. The present period is characterized by the elaboration and introduction of complex technological decisions at large warehouse facilities, which are being renovated and newly placed into operation, where particular importance is assigned to the use of the packing and containerization of cargo.

Considerable renovation of warehousing services is also being carried out during the 10th Five-Year Plan in the system of the USSR State Committee for the Supply of Production Equipment for Agriculture. Operating warehouse facilities are being supplied with new equipment, an improved freight handling technology is being introduced. As a result the capacity of warehouse buildings is increasing 1.5- to 2-fold, the level of mechanization of loading, unloading and warehousing operations is increasing by 15-20 percent, the cost of handling 1 ton of freight is decreasing by 20-25 percent. The construction of new warehousing facilities, including large highly mechanized facilities, is being continued. The height of the existing warehouse buildings in most cases is from 3.6 to 6 m, while, according to the data of PromtransNIIProyekt, with an increase of the height of the facilities of multiproduct rack storage warehouses from 6 to 12.6 m the cost of 1 m<sup>3</sup> of the building is reduced by 40 percent, which yields a saving of up to 360 tons of metal and about 600,000 rubles at each such facility. A height of the rooms of 9.6 m is envisaged by the standard plans of specialized warehouses, the estimated cost of the construction of 1 m<sup>2</sup> of the work area of which ranges from 80 to 120 rubles. This height of the warehouse at present is used as the base height, although due to the lack of the appropriate means of mechanization even these comparatively low facilities are only 75 percent utilized.

The development of the warehouse network in transport and first of all rail transport is a great reserve for improving the turnover of means of production. Despite the fact that brick and reinforced concrete buildings make up more than 50 percent of the enclosed warehouse area in rail transport, the bulk of the warehouse facilities are prewar buildings with a low storage height, which complicate the use of modern means of the mechanization of loading, unloading, transportation and warehousing operations. It is also possible to group with the shortcomings of old warehouse facilities the presence at the majority of them of narrow ramps, as well as the misalignment of the level of the floor of the warehouses and the cars, which complicates the work of the loaders. The situation is gradually improving. The provision of the material warehouses of the railroads with materials-handling equipment with a lifting capacity of up to 10 tons and more was required in connection with the delivery by industrial enterprises and statewide supply bases of metal in packets (7.5-10 tons each) and in containers, primarily medium-sized ones. Warehouses with a storage height of 6-8 m, which are being newly built, are being equipped with stacker cranes. Warehouses of the hangar type now make up approximately 15 percent of the

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warehouse areas. The use of gantry cranes with an automatic grab for the handling of heavy containers is being expanded. Pallets, containers and the new technical solutions of materials-handling, loading and unloading and warehousing operations, which are connected with their introduction, are becoming more and more widespread.

And yet the radical change in the structure of the material and technical base of the sphere of circulation, which backs the advanced technology of freight handling and the present amounts of the realization of the means of production, is still not occurring rapidly enough. The amount of capital investments allocated during the 10th Five-Year Plan will also not make it possible to eliminate the formed disproportions. The considerable expansion of the construction of modern warehouse, elevator and refrigerator capacities, of the output of specialized transportation equipment for the hauling of bulk, perishable and other cargo and of the production of advanced means of the mechanization and automation of materials-handling, loading and unloading and warehousing operations, which back the technical base of the process of integrating the transportation and warehouse network, is necessary.

The formed situation requires the further centralization of the management of the sphere of circulation of the means of production, the intensification of the concentration of warehousing services, the acceleration of the rate and the increase of the quality of its reequipment. The introduction in the sphere of the realization of the means of production of the achievements of scientific and technical progress on the level of the programs of the national economic complexes is making it possible to overcome the existing lag behind social needs in the level of its development at the present stage.

At this time this sphere is at the stage of the transition from the technical equipment with means of labor, which ensure the storage and movement of stocks of products for industrial engineering purposes without a change of the use value of the latter and without a radical change in the technology of materials-handling, loading and unloading and warehousing operations, to the gradual saturation with means of labor, which change the adopted technology of materials-handling, loading and unloading and warehousing operations and promote the greatest preparedness of the use values of the products being delivered for the interests of production. The launched construction of powerful completely mechanized warehouse facilities is also an important aspect of the present stage of the introduction of scientific and technical progress in the sphere of circulation. Such warehouses, as units of intensive freight handling, form as if the key centers of the transportation and warehouse infrastructure. They promote the improvement of the transportation process and the use of modern types of packaging, containers and means of packaging along the entire route of the movement of means of production from the producer to the consumer.

In connection with the increase of the level of cooperation and the scale of production the extensive introduction of standardized transportation

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packaging and pallets, cargo packages and containers, especially specialized and heavy ones, is revealing means for the considerable acceleration of the turnover of means of production. This will be promoted by the stepped-up development of the production of container carriers: ships, trucks and so on, including those equipped with their own drive element, which makes it possible to grab a load without the assistance of a dlinger; of container reloaders with a large lifting capacity and an automatic grab; of highly productive cranes and loaders; of package-making machines and so forth.

Further advances in the development of the technical base of the processes of storing and transporting means of production, which would ensure the optimization of the entire cycle of their economic turnover in physical production, are necessary. The urgency of these tasks stems from the need to increase production efficiency and work quality, the importance of which was emphasized by L. I. Brezhnev at the June (1980) CPSU Central Committee Plenum.

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OCEAN AND RIVER

GEOGRAPHY OF MARITIME NAVIGATION

Moscow GEOGRAFIYA MORSKOGO SUDOKHODSTVA: UCHEBNIK DLYA SUDOVODITEL'SKOY SPETSIAL'NOSTI MORSKIKH VUZOV in Russian 1979 pp 2, 291-295

[Annotation and Table of Contents from the book "Geografiya morskogo sudokhodstva: uchebnik dlya sudovoditel'skoy spetsial'nosti morskikh vuzov" by G. L. Nadtochiy, Izdatel'stvo "Transport," 295 pages]

[Text] The general fundamentals of the geography of maritime shipping are outlined in the textbook and the characteristics of the main shipping routes in the world ocean are given. The role and significance of maritime transport in support of shipments and foreign trade ties of different countries is pointed out.

The book is intended for students of ship navigation faculties of higher maritime engineering schools of the Ministry of the Maritime Fleet and for students of the operational and economic faculties of the Institute of Maritime Fleet Engineers. It is also of interest to specialists of the maritime fleet and may also be used by workers in other types of transport.

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SEA TRANSPORT STATISTICS

Moscow STATISTIKA MORSKOGO TRANSPORTA in Russian 1979 signed to press 22 Nov 79 pp 2, 232

/Annotation and table of contents from book by M.I. Bruskin, Izdatel'stvo "Transport", 3,000 copies, 232 pages/

[Text] Annotation

This book describes the basics of the common theory of statistics and outlines in detail the methodology and practice of sea transport statistics. Particular attention is given to questions having to do with calculating the system of indicators and evaluating the operation of the fleet and ports. Examples are cited which characterize the theory and practice of sea transport statistics, the role and importance of the automated control system. This edition outlines all changes in the practice of statistical accounting that have occurred since publication of the preceding edition in 1971.

The book is to be used by students of higher maritime institutions of learning; it can also be used by workers in sea transport in practice. The book contains four illustrations and 75 tables.

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