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TECHNOLOGICAL EQUIPMENT OF TRADE ORGANIZATIONS



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The study manual deals with the technological equipment of trade organizations. There are classifications of handling, lifting and transport equipment, weighing equipment in this study manual. The factors influencing the choice of technological equipment in trade are presented in this work. Also it is marked calculations of the optimal amount of handling equipment. Situational workshops and cases are proposed to work out theoretical aspects. The study manual is intended for students, undergraduates studying in the following areas: “Trading”, “Commerce”, “Management in retail” and other areas. Also, the materials are of interest to retail managers.

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Introduction

Technological and commercial equipment is the basis of a modern store. The importance of such factors as efficiency and uniqueness in today's competitive environment comes out on top. The efficiency and manufacturability of a business is a competitive advantage of a trade organization.

You can consider several aspects of technological equipment of the store. First of all, the business processes of the functioning of the trading facility, which can be divided into commodity flows, analytics systems, the distribution of the load on staff, the control and accounting system.

Technical progress in trade is expressed in the improvement of the trade process. A significant role here is played by the level of development of the material and technical base of trade, the mechanization and automatization of hard and labor-intensive work.

Systematization of the technological process with the use of computer technology begins with the delivery, acceptance, packaging, packaging, labeling, storage and ends with the calculation with customers using cash registers, including using payment cards. Automation and mechanization of the trade process today has not only the objective of increasing the efficiency of the trade organization, but also improving the speed and quality of customer service.

Handling, lifting and transport equipment is used to carry out operations related to loading into transport, unloading them from wagons, transshipping, transporting, sorting cargo

in warehouses, cargo yards, during transshipment. The use of loading and unloading machines and other equipment for cargo handling is the basis of the mechanization of loading and unloading.

Knowledge of modern technological equipment, its quality characteristics provides a deeper understanding of the processes taking place, which in turn shows situational opportunities and growth points. The consequence of the above work will be an understanding of the required characteristics in the use of existing premises and equipment. This will make investments in fixed assets of the trade organization more efficient. Often there is a completely reverse process. First, the trade and technological equipment is acquired, and then the technology of work is invented. Such an approach is possible, but does not guarantee an optimal choice of equipment and can lead to meaningless waste of funds.

The study manual reveals the features of the trade organization as an object of property complex, the classification of technological equipment, the appointment of each of the types and other material of theoretical and practical nature. At the end of each chapter are posted topics for reports and essays. In order to form future specialists in terms of the technical equipment of trade organizations with knowledge and skills in a textbook, a substantive theoretical-practical material is presented. The objectives of the study of the textbook are the development of skills and abilities to ensure the rational use of all types of transport, trade and technological equipment.

Chapter 1. Technological equipment in trade

1.1. Objectives, principles and methods of technical installation of trade organizations

The main organizational and economic component of trade is a trade organization. *Trade organization* – an organization of various organizational and legal forms, carrying out trading activities, including the necessary funds and employees with the distribution of responsibilities, powers and relationships.

Trade enterprise is a property complex located in a shopping facility and outside a shopping facility used by trade organizations and individual entrepreneurs to sell goods and / or provide trade services.

A commercial object is a building or part of a building, a structure or a part of a building, a structure or a part of a structure specially equipped with equipment designed and used for laying out, displaying goods, serving customers and conducting cash settlements with buyers when selling goods.

Distinguish, stationary shopping facility is a shopping facility, which is a building or part of a building, a building or part of a building, firmly connected with the foundation of such a building, building with the ground and connected (technologically connected) to the networks of engineering and technical support.

Non-stationary trade object is a trade object representing a temporary structure or temporary structure that is not firmly

connected with the land plot, regardless of the presence or absence of connection (technical connection) to the networks of engineering and technical support, including a mobile structure.

The main task of the trade enterprise is economic activity aimed at meeting the needs of the population served and making a profit.

It is very important to determine the type and type of tradecompany, since its legal status, forms of ownership, size, and aspects of the management of owners influence the equipment complex of the organization of trade and technological equipment.

As to the aspects of managing the owners of an organization, it can be divided into enterprises owned by one owner, partnership enterprises, corporations owned by many owners. On the one hand, unity of command in relation to the owner of a trade organization has a positive effect on the choice of trade and technological equipment. This is manifested in the reduction of time for the procedure of selection, selection and coordination of models. At the same time, the partnership of owners allows to achieve the optimal ratio for all criteria for the selection of equipment.

Technical equipment is influenced by the trading and operational process, which in the store consists of such sequential operations:

- acceptance of goods;
- storage;
- preparation for sale, etc.

To perform these operations, all the premises of the store are equipped with certain sets of furniture, respectively, for the sales area and utility rooms. It is very important to choose the

type of furniture for each store, to determine its quantity, since rational organization of the sales process, increase in labor productivity of trade workers, the fullest use of the store's floor space, the size of the working stock of goods in the sales hall, quality of customer service, depend on it as well as the interior of the trading floor. When choosing furniture to equip the store, they take into account the way customers serve, the particularities of sales and storage of specific groups of goods, the volume of their sales, the frequency of stock replenishment.

If we consider various types of retail trade organizations, then it is necessary to study the specifics of their trading activities.

So, retail trade organization:

- 1) purchases goods from the manufacturer or an intermediary and offers them for sale to the consumer in an unchanged form or after the usual retail processing (preparation for sale);
- 2) forms a range of products and a list of services to meet the needs of customers;
- 3) show samples on open trade stands in order to receive orders for goods;
- 4) distributes goods ordered by catalog, samples, samples or on the basis of other offers (mail-order trade);
- 5) organizes trade with home delivery;
- 6) organizes peddling trade;
- 7) organizes street trading.

For each of these trade and technological processes are characterized by their own features of technical equipment, due to the nature of the sale of goods. For example, organizing street vending requires countertops with a special, street cover, made in the anti-vandal version. Also, such equipment is equipped with autonomous cooling systems.

For hacking, you need lightweight, compact, mobile equipment with autonomous power supply.

Equipment for car dealerships and grocery stores will a priori be different in terms of technical characteristics, design, and design.

The level of technical equipment of the enterprise determines the production efficiency of the main production, determines the possibility of the rhythm of its production with the specified consumer properties. Today, trade organizations have their own production, such as: cooking (salads, meatballs, steaks, meatballs, etc.), bakery (loaves, baguettes, puffs, cakes, etc.), confectionery (cakes, pastries), meat (minced meat, goulash, zrazy, etc.) products. That is why the pressing issue for trade company is to equip them not only with trade, but also with technological equipment.

1.2. Factors, determining the technical installation of trade organizations

First you need to define the technical equipment of the enterprise. We give the following definitions of this concept from different points of view.

Technical equipment of a trade enterprise is a complex of regulatory and technical measures governing the design and technological preparation of the trade and production process, as well as the system of equipment placement of a trade organization. The equipment is equipped with a sales area, warehouse, utility and administrative premises of the enterprise.

These events provide full readiness of the enterprise for its activities. Refrigeration equipment is used at shop in the sales

area (refrigerated showcases, racks, bonnets, chests, etc.), in warehouses (cold rooms). The main criterion for selection is the temperature maintained by the refrigerating chamber or refrigeration unit, overall dimensions, therefore, the capacity of the refrigerator as well as installation method.

In relation to the trade organization, the technical equipment of the enterprise is part of the trade and technological process.

Technical equipment of trade organizations is the process of completing a shop with trade and technical equipment in order to ensure its functioning.

In the process of technical equipment of trade organizations in a market economy, the following factors should be considered:

- design features of a trade building, warehouse (number of floors, placement of supporting columns, floor level, dimensions of premises, etc.);
- method of selling goods and their range;
- types and technical characteristics of trading and process equipment;
- the possibility of comprehensive mechanization of loading and unloading;
- economic efficiency of the use of technological equipment;
- the possibility of improving the working conditions of workers.

After a thorough study of all parameters, the manager should draw up a plan for the technical equipment of trade organizations, taking into account:

- security with design and estimate documentation;

- planned equipment efficiency, labor costs in monetary units;
- terms of delivery by suppliers of equipment and cash registers corresponding to the reference models of models entered in the State Register, etc.

The main tasks of technical equipment of trade organizations are:

- 1) Ensuring the functioning of a trade enterprise;
- 2) Optimization of trade and technological processes;
- 3) Ensuring the effective use of material, financial, labor resources of a tradecompany;
- 4) Improving the efficiency of tradecompany, etc.

1.3. Effective management of the property complex in trade

In general, management is a process of purposefully influencing a system to transform it into a new state or to maintain it in an existing state. Management is a purposeful process that is carried out continuously in time and space, requiring in-depth analysis, development and setting of new goals. Each control system has a control object and a control subject.

The subject of management is a control unit, element or set of elements of a control system acting on another or other elements. The control subject directs to the control object impulses of influence, which contain information, directly or indirectly, on how the control object should function in the future.

The subject of management of a trade enterprise as a property complex is a group of officials (managers, specialists) of the relevant structural units responsible for the formation, operation and improvement of the organization's technical equipment.

The control object is a controlled link, element or set of elements of the control system that perceives control actions. It receives management teams and operates in accordance with the content of these teams.

The subject of management of a trade enterprise as a property complex is directly the complex of assets of the organization, the units responsible for their operation and technical condition.

In the process of implementing management interaction within the framework of managing the property complex of a trade company, a managerial relationship arises between the subject and the object, the essence of which is the interest of the subject of management in the effective functioning of the organization's asset complex, that the subject generates management teams related to the optimal process of formation and operation such a complex. The object of management, motivated by the subject, behaves accordingly management teams.

Direct and feedback is carried out between the subject and the control object. Direct communication is realized through control actions and their accompanying information, and feedback through control over the result of system operation.

Relations of management exist between the subject and object of management as a result of the implementation of management communication and management interaction. It is these relationships that become the basic ability to directly manage, since they set the opportunity to develop management teams (subject) and the willingness of these teams to perform (object).

To implement the effective management of a trade enterprise as a property complex, it is necessary to formulate management principles:

1) the unity of direction, goals of activity.

The speed of development of scientific and technological progress, the emergence of improved equipment (for example, online cash registers, refrigerators with low power consumption), elements of modification of existing equipment (modules of fiscal memory to cash registers), as well as high market competition requires quick effective actions from management entities. Therefore, the object of management must understand and share the goals of the organization. At the same time, the management of the trade organization should strive for the mandatory consistency and one-direction of individual and group goals with the goals of the division and organization;

2) authority and responsibility.

Powers – limited right to use the resources of the organization and direct the efforts of some of its employees to perform certain tasks. Responsibility – the obligation to perform existing tasks and be responsible for their satisfactory resolution;

3) leadership.

Each manager must clearly understand the organizational goals and rationally evaluate his contribution in order to give clear orders to his subordinates who are aimed at realizing the goals of the company. The principle of “leadership” has replaced the principle of “unity of command” and assumes that a subordinate can receive orders not only from one leader, which requires a high level of qualification and responsibility from both the subordinate and the manager. The principle of “leadership” emphasizes that the management of a trade organization is not the task of one individual, but the work of a collective, group;

4) the division of labor.

Specialization is the basis of the division of labor, which involves the execution of work, larger in size and better in quality, with the same effort. This is achieved by reducing the number of goals to which attention and effort should be directed;

5) coordination of personal, group and organizational interests.

Forming organizational goals, the organization takes into account the interests of various groups, including its staff. Thus, to ensure the unity of the objectives of the trade organization, it is necessary to seek consistency of the interests of the person (group) and the company;

6) command system.

The command system is a series of interest groups that are able to ensure the manageability of a firm, achieving efficiency and effectiveness. One of the key teams is the senior executive team;

7) centralization / decentralization.

The degree of centralization will vary depending on the specific conditions. Therefore, the question arises about the correct proportion between centralization and decentralization. This is the problem of determining the measure that will provide the best possible results;

8) stability of the workplace for staff.

High staff turnover reduces organization effectiveness. Including in this connection the level of technical equipment of a trade organization plays a huge role in its activities;

9) remuneration, staff motivation.

To ensure loyalty and support of employees, they should receive fair remuneration for their work;

10) initiative.

An initiative means developing a plan and ensuring its successful implementation. It gives the organization strength and energy;

11) justice.

The fairness of the subject of management in relation to the object is a highly motivating tool for high-performance activity that does not require material costs;

12) discipline.

Discipline involves the construction of a clear organizational structure of management in the enterprise, as well as compliance with the functioning of vertical and horizontal communications;

13) organizational culture.

Organizational culture – the artifacts of the company, traditions, rules of conduct that ensure the unity of the staff, the implementation of the strategy and the achievement of goals.

A modern trade organization is an organization capable of quickly responding to dynamic changes, continuously improving technologies and the uncertainty of the external environment. The modern approach to managing an organization consists in a balanced combination of human values, organizational change and continuous adaptation to changes in the external environment.

To build an effective management system, it is necessary to distinguish classical management functions:

- planning;
- forecasting;
- organization;
- motivation;
- control.

Identifying the features of a shop will improve the efficiency of its management system as a property complex.

These features include the fact that:

a) the main function of the enterprise is the sale of food and non-food products. Specificity is also manifested in the fact that food products can be perishable, the implementation period of which does not exceed 72 hours. In connection with this, the object of control is the process of selling goods;

b) the object of management also becomes the process of promotion of goods at the point of sale. High competition in trade encourages manufacturers and intermediaries to form whole complexes of product promotion at all stages of product distribution. The key element is the trade object as the final stage of the movement of goods to the consumer. In this regard, the organization of presentations, tastings in the trading floors of the shops involves the installation of specialized equipment;

c) a large number of trade organizations sells a wide and / or deep range of goods, which complicates both the management process as a whole and the process of selecting and installing the corresponding technological equipment;

d) government regulation of trade determines the need to install certain equipment to comply with the principles of legal operation (for example, test scales, online cash registers, etc.);

e) interaction with the media, both in order to promote a trade organization (online store, promotion on social networks, etc.), and ease of access to the general consumer's Internet environment (for example, in the form of posting photo and video files more often all with negative information about the store) encourages business management to form a system for managing such relationships;

f) different scales of trade organizations (small, medium, large network) predetermine various approaches to the organization of the management process;

g) the interaction of the retailer with the end user imposes additional requirements on the organization of the process of relations with suppliers and manufacturers of goods, product quality control, and return of goods for various reasons.

The study of such features of a trade organization will make it possible to build a clear management system for both the enterprise as a whole and its assets, the non-current part of which is represented by trade and technological equipment.

1.4. Technological equipment: definition, determining factors

Technological equipment is cranes, conveyors, loaders, blocks, hand trucks, jacks, mechanical carts, electric loaders, electric stackers, car loaders, weigher, scales and others.

Factors, determining the choice of technological equipment

The choice of technological equipment is very important and difficult process. Model, overall dimensions, components are of great importance in the preparation of the specification of trade and technological equipment for the purposes of acquisition by a trading enterprise. In addition to these, it is necessary to take into account other factors that must be considered when choosing equipment, namely:

- Customer service method;
- Features of sales of goods;
- Storage features;

- Volume of sales;
- Frequency of stock replenishment;
- Assortment of goods;
- Convenience of staff;
- Reliability, durability;
- and other factors.

1.5. Control questions, topics of reports and essays on chapter 1

Control questions for Chapter 1:

1. Define a trade organization.
2. Discuss principles of technical installation of trade organizations.
3. Describe methods of technical installation of trade organizations
4. Describe functions of retail trade at the macro and micro level.
5. Describe the concept of technical installation of a trade company.
6. Describe factors, determining the technical installation of trade organizations
7. Consumer and logistics flows and their accounting in the process of technical equipment of a trade organization.
8. Organization and technical equipment of the parking space of the trade organization.
9. Mechanization and automation of technological processes of trade organizations.

Essays' topics for Chapter 1.

1. Expand the features of equipping organizations with trade and technological equipment depending on their type.
2. Justify the requirements for trade and technological equipment, which imposes a modern retailer.
3. How, in your opinion, the choice of trading and technological equipment affects the management of the trading process?
4. Expand the features of the stages of selection of trade and technological equipment, depending on its type and type.
5. Innovations in the equipment of trade and technological equipment.

Reports' topicsfor Chapter 1:

1. The role of technical equipment of trade organizations in improving the efficiency of trade and marketing activities.
2. Modern technical equipment of trade organizations in Russia and prospects for its development.
3. Aims and objectives of technical equipment of trade organizations in the modern economy.
4. The impact of the level of technical equipment of trade organizations on labor productivity.

Chapter 2. Handling, lifting and transport equipment

Handling, lifting and transport equipment is used in railway transport to carry out operations related to loading cargo into wagons and various types of transport, unloading them from wagons, transshipping, transporting, sorting cargo in warehouses, cargo yards, during transshipment and. p. The use of loading and unloading machines and other equipment for cargo handling is the basis of the mechanization of loading and unloading.

Handling equipment – machines (devices) designed to move goods and people in vertical, horizontal and inclined planes for relatively short distances within factories, construction sites, ports, warehouses, etc.

2.1. Factors, determining the choice of lifting and transport equipment

The choice of means of mechanization is determined by the following factors:

- 1) type of cargo (bulk, piece, lengthy) and its physical and mechanical properties;
- 2) type of transport;
- 3) volume of work performed;
- 4) type of work performed. For loading, unloading, handling, stacking works with bulk or packaged cargoes, loaders use periodic actions with various lifting devices, self-propelled continuous loaders, special car-unloading machines

that carry out only unloading of cars. All these machines are individually driven (electric, hydraulic or internal combustion engine);

5) and others.

When choosing a loading and unloading machine, plant and equipment, it is necessary to proceed from the following provisions:

– loading and unloading machines, installations and equipment must:

– to ensure effective loading and unloading of materials and goods, as well as their movement within the construction site or outside it, to be reliable in work, safe for staff;

– to be mutually coordinated in terms of productivity, type of rolling stock and to ensure the qualitative and quantitative safety of the materials and goods being handled;

– to ensure the integrated mechanization of the production process, and, where possible, its automation;

– to ensure the least laboriousness and cost of loading and unloading operations, as well as to reduce the time of construction of facilities.

When choosing loading and unloading machines and cyclic installations (single-bucket universal loaders and forklifts, special loaders, cranes of various types, single-bucket excavators with special loading equipment, automobile self-loaders, railway car unloaders), the initial data are production factors that characterize the working conditions of the above means mechanization, working independently or in a set with vehicles.

The main initial data are:

– the volume of work performed at the facility (point of cargo handling);

- the type of loading and unloading operations (loading, unloading, warehousing, stacking, moving, etc.);
- types of materials to be handled and cargo (bulk, lumpy, lumpy, piece, packaged, long), their volumetric characteristics, dimensions, weight;
- distance of movement, height of unloading, radius of unloading;
- the degree of dispersion of objects (cargo handling points) on the site;
- soil and climatic conditions. The working equipment of the cyclic machines is chosen on the basis of the types of work that need to be mechanized:
 - for scooping, moving and unloading bulk and lump materials, tilting buckets with a normal or increased discharge height should be used, buckets are maxillary and with side unloading;
 - to perform warehousing with piece and packaged goods, including lengthy ones, you need to use various replacement equipment and lifting devices.

A large variety of material handling equipment, which most meets the requirements of mechanization and automatization of loading and unloading and storage operations, can be classified according to the main technical and operational characteristics:

2.2. Classification of handling, lifting and transport equipment

Depending on the technical characteristics of the handling, lifting and transport equipment, the following is classified:

1) on the performance of the handling, lifting and transport equipment:

a) Basic means of mechanization (cranes, conveyors, loaders);

b) Auxiliary (blocks, hand trucks, jacks, etc.)

2) the nature of the movement of materials:

a) Machines of periodic (cyclic) action – they move materials in separate portions at a certain time interval. They are characterized by the presence of idle, progress, i.e. after each capture and movement of the material, they are returned back unloaded. By machines and mechanisms of periodic, actions include all cranes, loaders, mechanical carts, telfers, etc.

b) Continuous machines – they move materials in a continuous stream, without stopping to capture and release material. Due to the lack of idling, they are more economical and productive.

These machines can be

- **with** traction working body (belt, plastic, scraper conveyors) and
- **without** traction working body (screw, roller and other conveyors).

Pneumatic transport and installations for the movement of bulk materials also belong to machines and mechanisms of continuous action.

3) in the direction of movement of goods:

a) Machines and mechanisms that move materials in a horizontal or slightly inclined plane. These include various conveyors, trolleys, winches, etc. As a rule, they are used in combination with other machines and mechanisms that ensure the loading of the working body of the machine and the removal of materials from it. For example, mechanical carts are used in conjunction with a crane and a stacker.

b) Machines and mechanisms that move materials in a vertical or close to it inclined plane. These include stackers, freight elevators, elevators, etc. These machines are particularly effective in multi-storey, warehouse buildings. They are also used in combination with other machines and mechanisms that ensure the transportation of materials to them in a horizontal direction and the loading of their working bodies.

c) Machines and mechanisms moving the material in a mixed direction (both in horizontal and vertical plane or along any trajectory in space). These include loaders, cranes, stacker cranes, telfers, etc. These machines and mechanisms are most versatile and are used for loading, unloading and warehouse processing of different transportability and storage conditions of materials.

Machines that move loads in the vertical direction or in the vertical and horizontal direction at the same time are called **lifting**.

Machines moving materials mainly in the horizontal direction are called **transporting**.

4) on mobility:

a) Stationary machines and mechanisms – they cannot be moved to another area of work without their dismantling and installation at a new place. These include lifting elevators, some machines;

b) Mobile machines and mechanisms and portable – they can be moved from one place of work to another without dismantling.

c) Among these machines (group “b”), a separate group consists of self-propelled ones, such as lifting cranes on railway, road, or crawler tracks, loaders, etc.

5) by mind the driving force:

- a) Gravity (gravitational action) – this is inclined descents, roller tracks.
- b) Manual actions are hand carts.
- c) Electrically operated – they operate from an electrical supply network or from batteries (electric loaders, electric stackers, etc.).
- d) Driven by an internal combustion engine (truck loader).

6) by transfer type:

- a) Machines with mechanical transmission.
- b) Machines with hydraulic transmission.
- c) Cars with electrical transmission.

Depending on the performance of the handling, lifting and transport equipment, it is classified:

1) by the type of materials processed:

a) Machines and mechanisms for processing piece and packing materials. They, as a rule, have a complex of replacement equipment, which is used for capturing materials in various containers – boxes, barrels, packs, bundles or piece bulk (bulk). Packaging pieces and packaged materials, the use of pallets and containers simplifies the use of machines and speeds up the process of recycling materials. For loading, unloading, moving and storing piece and packing materials used cranes of all types, loaders, conveyors and other machines.

b) Machines and mechanisms for the processing of long and heavy materials (timber, channel bars, etc.) are characterized by high carrying capacity and high productivity. These include cranes, special loaders, conveyors, etc.

c) Machines and mechanisms for processing bulk materials (cement, lime, coal, etc.) – in most cases, these are specially designed high-performance conveyor belts, vibratory plants, etc. Sometimes, when loading, unloading and stacking these materials, some types of universal machines are used: railway and bridge cranes, which are equipped with special lifting devices – grabs. In addition, pneumatic devices (pneumatic transport) are used to mechanize and automate the movement of bulk materials, especially pulverized and powdery.

2) the nature of the operations performed machines and mechanisms:

a) Highly specialized – they are intended for the production of any single operation (car dumpers, etc.)

b) Specialized – they are intended for processing of any one group of materials (pneumatic transport, etc.)

c) Universal – designed to perform various types of operations for the processing of various materials. This is the most common group of machines and mechanisms, which includes universal loaders, cranes, etc. A characteristic feature of most universal machines is their ability to mechanized or even automated capture of material from a rolling stock or stack, followed by transportation and stacking in a pile, car or railway carriage.

Under material warehousing conditions, it is often necessary to move materials simultaneously in horizontal and vertical directions, and, under certain conditions, along any trajectory. For example, when unloading from a car or car, materials must not only be moved to the storage location, but also lifted to a certain height and laid in a rack or stack. To perform this work, it is advisable to use machines and mechanisms that combine the characteristics of machines for horizontal and vertical

movements, i.e. are universal. In addition, the universality of these machines lies in the fact that they can process different types of materials: piece, packaged; in bundles, in packs, laid on pallets, and when installing a special lifting device (bucket or grab) – dry and lumpy materials.

Such universal machines capable of moving various loads in a mixed direction include battery, truck and special loaders, mobile jib cranes (on road and rail), bridge cranes (bridge and gantry cranes), cranes – stackers and others

Loaders. Accumulator loaders (electric loaders) and stackers are used for loading and unloading railroad covered wagons, trucks, stacking packaged cargoes and transporting goods over short distances. Electric forklifts, except for the forks, can be equipped with mixed lifting devices: swivel bucket, single-pin gripper, carriage with full lateral clamping, carriage with lower lateral clamp, gripper for barrels, multi-pin gripper, collider. Electric trucks are a self-propelled truck equipped with special devices to capture the lifting and lowering the load. They are of relatively small size, their own mass and external turning radius.

Within each group and type of machinery and mechanisms, the classification is further carried out according to the carrying capacity, the height of the lifting of the load and a number of other operational, technical and constructive attributes.

Loading and unloading and stacking machines are divided:

1) by type of drive:

- a) electric loaders.
- b) electric stackers.
- c) car loaders.

2) by type of running equipment:

- a) tracked.
- b) wheel.

3) by time of action:

- a) periodic.
- b) continuous action.

4) by types of goods transported:

- a) universal.
- b) specialized.

2.3. Calculation of the optimal amount of equipment

For the effective operation of the trade organization, it is important to calculate the optimal amount of equipment that will be exploited.

Calculation of the need of lifting and transport equipment for warehouse cargo handling.

The number of lifting and transport equipment (A) calculated by the formula:

$$A = \frac{Q * K_n}{P}$$

where Q is the amount of the processed cargo, t ; K_n – the coefficient of uneven receipt of cargo; P – equipment productivity, tons

The numerator values are known, but the performance of machines and mechanisms must be calculated.

The performance of the crane (P_k) depends on the weight of the load lifting (q_0) and the number of machine cycles for 1 hour of continuous operation (n_c):

$$P_k = q_0 * n_c$$

The number of machine operation cycles per 1 hour (3600 seconds) depends on the duration of one cycle of its operation (T_c) and is expressed in seconds:

$$n_c = \frac{3600}{T_c}$$

The cycle time of the crane (T_c) is the sum of the time required for the production of individual elements of the cycle, taking into account the simultaneous implementation (combination) of some of them:

$$T_c = K_c * \sum_1^n t = K_c * (t_1 + t_2 + \dots + t_n)$$

where K_c is the coefficient taking into account the reduction of the cycle time when combining several operations; n is the number of elements of the crane operation cycle; t – time spent on the execution of individual elements of the cycle, sec.

The hourly capacity of the loader (R_p) is determined by the general formula for batch machines, t/h:

$$R_p = \frac{3600}{T_c} * q$$

The number of new machines and installations mastered in recent years that can be effectively used in loading and unloading works with packaged construction materials (during loading, unloading and inter-warehouse movement) include single-bucket universal loaders, forklifts, electric forklifts, truck cranes, self-propelled jib cranes, gantry cranes, hydraulic cranes mounted on cars and trailers.

When choosing machines and installations of continuous action, production factors that characterize the working

conditions of the above-mentioned mechanization tools are also basic data, the main ones are:

- the volume of work performed at the facility (point of cargo handling);
- types of immersed materials (bulk, small piece, piece), their physico-mechanical properties (size, bulk weight, etc.);
- range of materials, height of discharge, climatic conditions, etc.

Each loading and unloading machine and installation has its own brand (index), although at present there is no single labeling in the country and various ministries and departments label them differently.

Below are the letter designations of the main cargo handling and material handling machines:

EO – the excavator equipment (excavators of general purpose and with the special loading equipment).

KS – self-propelled jib cranes, automobile cranes.

KB – tower cranes (mobile, auxiliary, self-elevating and loader cranes).

TO – transport equipment (single-bucket construction loaders).

TM – multi-bucket loaders.

TK – belt conveyors.

TA – pneumatic equipment for cement transportation.

TP – unloaders bulk materials.

DP – bulk solids dischargers.

The type of running gear of machines and installations is designated as follows:

G – tracked undercarriage (PG - crawler loader, KG – crawler crane, etc.).

GI – tracked undercarriage with an enlarged track surface.

P – pneumatic wheel chassis (PC – pneumatic wheel loader, KP – pneumatic wheel crane).

SS – special chassis of the automobile type.

TP – tractor chassis.

Pr – towing chassis.

2.4. Control questions, topics of essays on chapter 2

Control questions for Chapter 2:

1. Classification of handling, lifting and transport equipment.
2. Types of handling, lifting and transport equipment.
3. The choice of lifting and transport equipment and the calculation of the need for it.
4. Analysis of the market of handling, lifting and transport equipment.
5. Purpose and types of package forming equipment. Features of work.
6. Rules of operation and safety when working with taro equipment.
7. Classification of equipment by type of movement of goods.
8. Classification of equipment by type of drive.
9. Classification of equipment by type of running equipment.
10. Classification of equipment by time of action.
11. Classification of equipment by types of goods transported.
12. Factors, determining the choice of lifting and transport equipment.

Essays' topics for Chapter 2:

1. Type of cargo as a factor, determining the choice of lifting and transport equipment.

2. Type of transport as a determining's factor of choice equipment.
3. Volume of work as a determining's factor of choice equipment.
4. Factors, determining the calculation of the need of lifting and transport equipment.

Chapter 3. Scales and weighing equipment

Goods as a material value when moving from producer to consumer are repeatedly subjected to quantitative accounting. It is carried out by measuring the mass, length or volume. The accuracy and accuracy of quantitative measurements is provided by measuring equipment.

Purpose of weight measuring equipment:

- Determination of the mass of goods.
- Carry out the right calculations with customers and suppliers.

The most widely used of multifunctional measuring devices are scales.

Scale and weights is a measuring device for determining the mass by comparing it with the mass established by a government unit.

3.1. Requirements for trade weights

Rules of operation of scales include the requirements of long-term trouble-free operation and accuracy of testimony. Scales are periodically subjected to current, medium and major repairs, as well as calibration and marking. Verifications are revision, quarterly and annual.

Requirements for weighing equipment

1. Metrological:

a) stability – the property of the weights, when they are removed from the state of equilibrium, to return to their original position after several fluctuations;

b) *sensitivity* – the property of scales to respond to minor changes in mass with a slight change in the mass of the goods. Scales are considered sensitive if this difference does not exceed the mass of the permissible error;

c) *constancy of testimony* – the property of the scales to give the same testimony when repeatedly weighing the same product, regardless of its position on the platform. Deviations must be within the permissible error;

d) *weighing accuracy* – the property of the scales to give readings of the mass with a deviation from the present value within the limits of the permissible error. True weight is determined on model scales. Allowable errors for weights are expressed in graduations of the dial scale, in units of mass, as a percentage of a certain weight load. The value of the permissible error depends on the maximum limit of the scales, it is indicated in the technical passport of the scales and is used when checking the scales (at least once a year, and after each repair).

2. Trading:

a) *reliability* – the ability of the scales to reliably perform its functions during operation, subject to the rules and conditions of maintenance;

b) *visibility of indications* – good visibility and readability of the weights on the weighing results. For better visibility of the indications of weighing, the pointers of equilibrium are placed in the most visible place, painted with bright contrasting colors;

c) *maximum weighing speed* – the property of the scales, when weighing, to quickly determine the mass and value of the goods and restore balance after removal of the goods. Among

the lever weights have a relatively large speed scales, equipped with a damper;

d) *compliance of the weights with the properties of goods weighed*. This property means that the limits of weighing the scales must correspond to all possible values of the plumb of the goods.

3. Sanitary and hygienic:

Sanitary-hygienic is the neutrality of the material from which the scales are made, in relation to the goods being weighed; ease of care for weights. The neutrality of the material means that the coating of the scales should not cause any oxidative and other processes when the parts of the scales come into contact with the goods. The design of the scales should allow them to wash and clean.

Choose the type and model of scales should be in accordance with the standards of technical equipment stores. The need for weights for stores that do not correspond to the current nomenclature or differ sharply from it in power is established by calculation. In determining the need for self-service stores in the weighing equipment, they proceed from the number of places of acceptance and packaging of goods, the weighting of goods by the buyer. Shops in which semi-automatic scales are not provided for the packaging of goods, the need for desktop dial scales is determined by calculating the scales for each packer.

3.2. Classification of weighing equipment

There are various classifications of weighting equipment. Signs of classification may be: installation place

1. Depending on the installation place scales are divided into:

- a) table;
- b) mobile;
- c) stationary;
- d) built-in;
- e) mortise;
- f) outdoor.

Table weights are table-weighted and dial, tray, optical and electronic scales. All of them are designed for weighing small loads in the range, usually from 2 to 15 kg. Therefore, they are most widely used in retail when selling goods to the buyer.

Mobile weights include platform scales for weighing large masses of loads. These weighing instruments are installed on the floor in places where goods are received in warehouses and stores. Stationary scales to destination similar to the mobile platform. The difference lies in the fact that they are installed either in a recess specially made for them, or on a foundation. Mobile and stationary (mortise) scales are called commodity scales.

The stationary scales also include a very large weighing scales – automobile and wagon.

2. Depending on index (reading) device scales are divided into:

- a) weight;
- b) school;
- c) school-wide;
- d) dial-neck;
- e) dial;
- f) optical and;
- g) digital electronic.

3. Depending on type of reference and the method of taking readings weighing distinguishescales are divided into:

a) scales with a visual readout, when the readings are read from the dial, the screen, the display or the value of the weights are measured, and;

b) scales with documentary registration of indications of weighing when value of weight, and on some scales and cost of goods is printed on checks and tapes. The method of taking readings can be local, when the worker is near the scales, and remotely – at a distance.

4. Depending on application (operational purpose) scales are divided into:

- a) Carload;
- b) Trolley;
- c) Automobile;
- d) Monorail;
- e) Crane;
- f) Commodity;
- g) For weighing livestock;
- h) Elevator;
- i) For weighing milk;
- j) Luggage;
- k) Trading;
- l) Medical;
- m) Postage.

5. Depending on weighing accuracyscales are divided into:

- a) Middle class accuracy;
- b) Normal accuracy class.

6. Depending on type of balancing devicescales are divided into:

- a) Electromechanical (electronic);
- b) Mechanical.

7. Depending on type of cargo intakescales are divided into:

- a) Bunker;
- b) Monorail;
- c) Bucket;
- d) Conveyor;
- e) Hook;
- f) Platform.

8. Depending on way of achieving equilibriumscales are divided into:

- a) With automatic balancing;
- b) With semi-automatic balancing;
- c) With non-automatic balancing.

9. Depending on the type of reading devicescales are divided into:

- a) With analog reading device;
- b) With discrete reading device.

10. Depending on accuracy classscales are divided into:

- a) special;
- b) tall;
- c) average.

3.3. State and administrative supervision of weighing equipment

The correct operation of the weighing equipment is carried out by the supervision system, which is a set of rules, regulations and requirements that determine the organization and procedure for the verification, audit and examination of mea-

suring instruments. The purpose of this system is to protect the rights of consumers from underweight and measurement and to maintain weight measuring equipment in permanent serviceability.

State supervision ensures the unity and reliability of measurements, the content of weighing equipment in a state of constant readiness for accurate measurements. Gosstandart develops and approves standards for weighing instruments, methods for their verification, establishes a list of measuring equipment and a unit of physical quantities, organizes monitoring of the quality of manufacture and repair of all measuring equipment, periodic calibration and marking of scales, prohibits the release into circulation of measuring instruments that do not meet the requirements of standards, and removes unsuitable scales from circulation. State inspection is carried out by verifiers of the State Metrological Service, each of which has its own distinctive sign of oval, rectangular or square shape.

All scales and weights are subject to mandatory state verification and stamping after being released from the factory, after each repair (regardless of the date of the previous calibration) and planned state calibration once a year.

During state verification, weighing instruments are subject to technical inspection and control metrological tests for accuracy, sensitivity, stability and consistency of indications. A technical inspection checks the appearance of the scales, the condition and strength of individual parts, clarity, clarity and correctness of marking.

Administrative supervision is carried out by managers and owners of trade enterprises, who are responsible for the condition of the weighing equipment at the enterprise. They are

obliged to constantly monitor compliance with the rules of its operation, the timing of verification and branding in state inspection bodies; instruct workers on the use of weights; at least once a quarter to organize the verification of weights and weights, to withdraw from operation the defective and untested weighing equipment. Responsibility for the state of weighing instruments at the place of operation is borne directly by trade workers who use them. They are obliged to follow the rules of their operation, monitor the failure of measuring equipment, follow the rules of storage, immediately report to the management about all faults found in the scales.

When choosing weights, you should take into account: the type of enterprise, the area of the sales area, the number of departments and workplaces, the volume of trade, the range of goods to be weighed, their physical and structural features, the intensity of customer flows, the method of selling goods. It is also necessary to take into account the nature of their functions – weighing directly when selling goods to customers, preparing goods for sale or accepting goods.

The weighing process is greatly accelerated by using desktop optical and electronic scales. The greatest effect from the use of these weights is achieved during the packaging of goods and in the departments served by the seller. The use of these scales in the workplace of sellers in the sales areas of shops without self-service does not give the desired effect.

The accuracy of measurements, the accuracy of information on the availability of goods, the accuracy of accounting, the safety of goods and compliance with the rules of trade depend on the correct choice, installation and operation of measuring equipment.

Having determined the necessary type of scales, proceed to the calculation of the need for scales for a particular store. The need for scales for selling goods directly by sellers in the workplace is adequate to the number of jobs. The model of scales is selected in such a way that the maximum weighing limit is at least the maximum possible weight of the goods sold.

3.4. Control questions, topics of essays on chapter 3

Control questions for Chapter 3:

1. Classification of weighting equipment.
2. Types of weighting equipment.
3. Classification of way of achieving equilibrium.
4. Classification of type of reference and the method of taking readings weighing distinguish.
5. Classification of index (reading) device.
6. Classification of weighing accuracy.

Essays' topics for Chapter 3:

1. Metrological requirements for weighing equipment.
2. Trading requirements for weighing equipment.
3. Sanitary and hygienic requirements for weighing equipment.
4. Rules of operation of scales.

Chapter 4. Situational workshops and cases

Situational workshop

The theme of the situational workshop:

“Specification of trade and technological equipment as the basis of technical equipment of trade organizations”

The purpose of the workshop: the preparation of a draft contract for the supply of commercial and technological equipment on the most favorable terms

Expected result: the acquisition of skills in teamwork and practical skills for the preparation of specifications of commercial and technological equipment in order to conclude contracts for the supply of retail

The order of the practical work assignment:

1. Students are divided into mini-groups (4–5 people each), each of which represents a subject of relations on the issue of equipping a retail organization with trade and technological equipment and formulates its point of view on the subject under discussion.

Group 1 represents the production company LLC Ruskhold, which supplies commercial equipment (of various functional purposes and various brands), purchasing it from a foreign manufacturer. Works mainly with German equipment (Linde, Wanzl, etc.). Design, installation and after-sales service are also carried out.

Group 2 is LTD Oleks Holding, which supplies commercial equipment (of various functional purposes and different

brands), purchasing it from a foreign manufacturer. It works mainly with Italian equipment (“Arneg”, “Norpe”, etc.). Design, installation and after-sales service are also carried out. It is a direct competitor of Ruskhodol LTD.

Group 3 represents the company “Wanzl”, which is a manufacturer of commercial equipment (shopping trolleys, racks, trade and exhibition equipment, etc.), and also carries out direct deliveries of its own equipment to equip retail stores.

Group 4 represents the company “RazecVostok”, which equips stores with cash boxes and other equipment for the checkout and cash zone of the sales area (entrance group, cash boxes, anti-theft equipment, etc.).

Group 5 is a network of retail stores in Moscow “Edelweiss”, which implement the implementation of food and non-food products by self-service. The company’s development strategy envisages opening a large number of new stores and equipping them with commercial and technological equipment.

2. Each team (except for “Edelweiss”) should form a commercial offer for equipping Edelweiss stores with trade equipment. To do this, retail chain specialists should hand over to potential suppliers of equipment a technical task of equipping the store with showcases, counters, shelves, cash boxes, shopping trolleys, and so on.

After receipt of proposals, Edelweiss should choose the most advantageous offer for it.

After getting acquainted with the script of the workshop, answer the following questions:

a) What equipment list can be represented by: Ruskhodol LLC, OlexHolding LLC, Wanzl and RazecVostok Companies?

Describe the potential capabilities of each of the supplier companies.

b) What are the main criteria for choosing a supplier of equipment set by a specialist LLC “Edelweiss” in the current conditions?

c) in your opinion, what are the disadvantages and advantages of complex procurement of equipment from one supplier and each type of equipment from different companies?

Imagine that you are the head of the development department of Edelweiss LTD. The company is developing, opening new stores that need to be equipped with commercial equipment. It is necessary to conclude an agreement for the supply of trade and technological equipment. Identify possible solutions to this issue in the conditions outlined above.

3. The result of the team’s work is the “Equipment Specification for the Supply Contract”, which is prepared in a free and creative form and contains reasoned recommendations for restructuring a commercial enterprise.

The conclusion should consist of the following parts:

- list of necessary equipment for ordering with an indication of technical characteristics and quantity;
- prices for each element of the specification subject to the terms of delivery, installation, warranty service.

4. To improve work efficiency, the following roles are recommended in the team structure:

- “team leader” – job coordinator (1 person);
- “Experts” – the most competent listeners in the issues at hand (no more than 3 people);
- “Critics” – the rest of the team members participating in the discussion and making critical comments in the

process of preparing the progress report.

5. The teams are given 60 minutes to prepare the “Equipment specification for the supply contract” in writing, after which the team leaders make reports. The report has a duration of 8–10 minutes and should include:

- list of commercial and technological equipment with an indication of the conditions of its delivery;
- possible options for assignments to counterparties (both in terms of delivery and installation, and in the cost of a contract).

After completing each of the reports, members of the remaining teams are encouraged to ask questions and initiate brief discussions.

Case 1

Perform a shopping center project according to the following algorithm:

1. Choose a location (options: within cities of federal significance (Moscow, St. Petersburg), millionaire cities, cities with a population of 500 to 1000 thousand people, other cities; outside such cities).

2. Design the number of storeys.

3. Place possible tenants on each floor.

4. Come up with the name of the shopping center. List the main points of the concept of the functioning of the shopping center.

5. Identify the features of your shopping center for the buyer as the basis of competitive advantage.

6. Specify the possible means for advertising the shopping center.

Case 2

Make a list of commercial furniture and commercial equipment to equip the self-service store offered in options I – IV. Justify your choice by specifying the purpose of the furniture and inventory. Use the proposed or other known to you equipment options.

The results of the assignment reflect in the tables.

Option I. Shops like “Bakery” and (or) “Dishes”.

Option II. Shops like “Confectionery” and (or) “Clothing.”

Option III. Shops like “Groceries” and (or) “Fabrics”.

Option IV. Shops like “Tea, coffee” and (or) “Shoes”

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