NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

FACULTY OF AGRARIAN MANAGEMENT

PRODUCTION AND INVESTMENT MANAGEMENT DEPARTMENT

OPERATIONAL MANAGEMENT

for the students of the specialties 073 “Management”,
075 “Marketing”

KYIV - 2021

The most important thing, in my opinion, is not to blame someone for a mistake, but rather to find out what caused the error

Akio Morita

The secret of the Japanese is that they do not make reports on work, but work

Peter Drucker

By breaking up the work into many separate sections and assigning them to the set of individual workers, you can go so far that no one will imagine the process as a whole and the wheels will start idling

Bill Gates

УДК [005 : 811.111] (072)

The offered manual is prepared to study the discipline "Operational Management". It contains a curriculum, guidelines for self-studying of course topics, questions for self-control, practical plans, tasks, tasks for self-studying of the applied aspects of operational management. The manual contains a list of recommended reading and a list of the used sources.

For the University students, PhD students, University professors and everyone interested in production management and operations. It can also be used for self-education.

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Educational edition

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CONTENT

INTRODUCTION

Analysis of the ways of implementation of the economic reforms in Ukraine shows that market transformations at the macroeconomic level alone are not enough to bring the country out of the crisis. Despite the fact that the state has formed the structure of commercial and investment banks, the system of stock and currency exchanges, insurance companies and other market institutions, and inflation has been controlled, production continues to stagnate. At the same time, practice shows that even in the current difficult and not very favorable economic conditions (high taxes and bank rates for credit, insolvency of enterprises, etc.) it is possible for the businessmen to produce a profit. Analysis of the activities of many successful enterprises in the current environment of industry and services has led to the conclusion that their achievements are largely based on thoughtful management of the operational system of enterprises.

With the transition of Ukraine to market relations fundamentally new requirements are imposed to the enterprises and their operational systems. Therefore, managers of all levels of industrial production and services should possess knowledge in laws, principles and methods of effective management, production of competitive products, be able to develop a highly profitable operational system. The purpose of this manual is to highlight the modern concepts of domestic and foreign authors on the organization of the enterprise, advanced domestic and

foreign experience, as well as the principles, methods and techniques of management in relation to the operational system of the enterprise.

Development of any firm and the level of its competitiveness largely depends on how well the management of its production resources is organized. This is the main task of the operational management. Operational management develops organizational systems and ensures the most efficient use of materials, human resources, equipment and production facilities in the process of manufacturing products or providing services and managing them.

Today the presence of the specialists-managers is a separate qualitative factor in the successful management of operational systems of all forms of ownership and activities. The complexity of management decisions lies in modeling the structure and direction of operations. The more complex the object of management is the more necessary things related to the operational management become, i.e. the ability of the manager to optimize the operations, to form the appropriate mode of operations, to be ready for mobile justification and structuring of the decisions. These principles should be taken into account and developed in a step-by-step process of training a modern manager.

The purpose of teaching the discipline "Operational Management" is the formation of future managers' skills to develop operational strategy, to create and use the operational subsystems as a basis for achieving the mission of the organization. The structure of

the discipline covers individual topics that are functionally and logically related. The development and deepening of the tasks of the discipline outside the course of lectures should be sought in the additional literature sources.

INTRODUCTION TO THE COURSE “OPERATIONAL MANAGEMENT”

The purpose and objectives of the discipline

For effective management of business entities theoretical training and acquisition of practical skills in operational management is crucial. Operational management is one of the basic functions of any enterprise.

The aim of the course is to master a set of knowledge about production and its organization, operational systems and operation itself; formation in the future managers' ability to develop operational strategy, create and use industry of operational systems as a basis for ensuring the achievement of the organization's mission.

Tasks:

- to study theoretical and methodological bases, categorical apparatus of operational management;

- to master the basic features, principles and methods of operations, operational systems of various types;

- to gain knowledge on the development of operational strategy of the enterprise;

- to possess skills to justify the decision to create an operational system, support of the proper mode of its functioning;

- to study the basics of quality management and assurance of product competitiveness;

As a result of studying the discipline the student must

know

- goals, principles, functions and methods of operational management;
- essence and stages of operational strategy development;
- features and properties of the operational system;
- enterprise systems as an object of operational management;
- basics of operational activities of enterprises;
- management of the current operation of the operational system;
- performance of operational management.

be able to

- justify decisions to create an operational system,
- support proper mode of its functioning;
- develop an operational strategy of enterprises;
- apply in practice the acquired knowledge to increase efficiency of operational performance management.

Interdisciplinary connections. The Operational Management course is related to the cycle of disciplines of general economic and professional training of the bachelor and is based on previously acquired knowledge, practical skills in disciplines: "Fundamentals of economic theory", "Macroeconomics", "Microeconomics", "Business Economics", "Marketing", "Statistics", "Management", "Theory of Organization".

The program of the discipline contains

CONTENT MODULE 1

OPERATIONAL SYSTEM OF THE ORGANIZATION AND OPERATIONAL MANAGEMENT

Topic 1. Operational management as a kind of functional management

The essence, scope and organization of production activities of people. Relationship of functions of the organization with management. The concept of operational management and evolution of its development. Goals and objectives, content, areas and objects of operational management. Operational management as a kind of functional management. The process of implementing operational management. The purpose and objectives of the operational manager. Areas of decision making and functions of the operational manager. Functions of operational management: planning, forecasting, organization, motivation, control. Methods of operational management: organizational, administrative, economic, socio-psychological. Development and use of effective methods in production and operational management. Principle provisions of modern operational management.

Topic 2. Operational strategy

General characteristics of the content of the operational strategy of the enterprise. The essence of operational strategy. Operational

priorities. Main competitive priorities. Working framework of operational strategy in production. Operational strategies: from customer needs to order fulfillment. Key operational opportunities. The process of implementing the strategy. Formation of production strategy. Production capacity solutions. Vertical integration. Strategies that determine the dynamics of production technology. Making strategic decisions on the scale of production of traditional and new products. System of strategic measures for the use of production personnel. Quality management. Solutions for the development of production infrastructure. Relationships with suppliers and other cooperation partners. Distribution of ready products. Production management. Features of the service sector that affect operational strategy. The role of operations in ensuring competitiveness on corporate level in the field of service. Development of process strategy. Types of process strategies.

Topic 3. Operational system of the organization: structural and process characteristics

System approach in operational system of management. Basic principles of system approach in operational system management. Operational system as an element of the organizational system. Operational system as a special class of system. Production enterprise as a complex dynamic system. Production structure systems. Operational system as an object of management. Operational system

as a unity of interconnected subsystems. Characteristics of the processing subsystem. The structure and functions of the support subsystem: technical preparation of production; technical production service; resource provision. Planning of subsystem and control of the organization. Hierarchy of the production system of the enterprise. The influence of the external environment on construction and operation of the system. Characteristic features of operational systems. Typical structures of information transfer in operational systems depending on the type and construction. A set of functional tasks that are solved.

Typology of operational systems. Characteristic features of the organization of production systems on the basis of the established uniform characteristics of types of production. Classification of operational systems on various grounds. Two-dimensional approach to classification of operational systems (matrix "product-process"). Characteristic features of the project-type operational systems. Small series production. Mass production. Operational system. Operational system with continuous process. Requirements that modern operating systems must meet.

Topic 4. Production process

The concept of operational activities of the enterprise. The essence of the operational function. The main types of conversion. The composition of fixed resources as inputs to the operational activities.

Operational system in the general structure of industrial enterprises. Resources as controlled factors of production. The concepts that used to measure resources: "bottleneck" ("insufficient resource"), "Surplus resource", "resource of limited power".

Operational (production) process of the organization as the basis of functioning and operational system development. Technological operation. Stages of the production process. Classification of production processes. Types of production process depending on the method of organizations. Basic principles of organization of production processes: differentiation, concentration and integration, specialization, proportionality, parallelism, directness, continuity, rhythm, automaticity, flexibility. Organization of the production process in space and time. Differentiation of production process at the enterprise. Production structure of the enterprise. Forms of organization of production: group (technological), subject and flow. Formation of production units of the enterprise. Organizational and technical level of production. Methods of calculation. The main ways to increase the organizational and technical level of production.

CONTENT MODULE 2
CURRENT OPERATIONAL MANAGEMENT SYSTEMS

Topic 5. Production strategy and competitiveness of the enterprise

Economic strategy of the organization and the need for its development. The most significant features of the organization's strategy. Stages by which testing is carried out. The process of strategic planning. Formation of a strategic plan. Management survey. Stages of strategic planning. Models of choosing options for economic strategy of the organization. The Boston Matrix consulting group (BCG). Porter's competitive strategy model. Determination of Porter analysis components. The essence of the production strategy. Strategy and tactics in operating room management system. Production strategy. Criteria for implementing the strategic plan. Storage strategies and tactics in operational management.

Topic 6. Planning and projecting in the operational process of the enterprise. Project Management

Project management. Prerequisites for projecting the operational system. Interrelated aspects of projecting of production systems: production, structural and organizational, aspects of efficiency. Methods of projecting the operational system of production enterprises. Characteristics of the general condition of the operational system at the enterprise. Operational triangle. Methods of designing the operational system of a manufacturing enterprise. The main stages of the operational system projecting process. The main stages of the

process of product projecting. Factors to consider when projecting services. The tools that are most widely used in process planning. The essence of the project approach to organizational management. Project as a sequence of interrelated operations. The main features of the project. Classification of projects. Project approach. Project management. Project management rules. Project planning. Postoperative list of works. The structure of the project. Qualitative development of the project work structure. The main characteristics, features, benefits and shortcomings of a separate project. project. Classical matrix organizational form of structures, its advantages and disadvantages. Project estimate.

Topic 7. Management of material resources

The main motives for the creation of inventories. Classification of stocks of enterprises. The main functions performed by stocks: protection of prices from inflation; cost management through the use of discount; accumulation. "Extracting" and "pushing" operational management systems. System of operational and calendar planning. In-Time Production System. Systems "just in time": positive and negative features. Inventory management systems and their main types. The essence of inventory management. Inventory management system. System parameters of inventory management.

I. THEORETICAL MATERIAL USED IN THE LECTURES

CONTENT MODULE 1

OPERATIONAL SYSTEM OF THE ORGANIZATION AND OPERATIONAL MANAGEMENT

Topic 1. Operational management as a kind of functional management

1. The essence, scope and organization of production activities of people. Relationship between organizational function and management

2. The concept of operational management and the evolution of its development

3. Goals and objectives of operational management

4. The process of implementation of operational management

1. The essence, scope and organization of production activities of people. Relationship between organizational function and management

Every enterprise in the process of its operation carries out production activities, which, along with financial and marketing activities, ensures the achievement of its goals.

Production activity is understood as a set of purposeful processes carried out by people through means of labor or natural processes, as a result of which objects of labor are transformed into finished products, changing their composition, condition, shape and obtaining certain new properties.

The production activity of the enterprise is a complex process. It consists of production - the process of manufacturing marketable products and production maintenance activities (tool, repair, transport, warehousing, energy, logistics, etc.). In turn, every production service or supply in the framework of its tasks also performs the function of converting input components into finished products, i.e. it is also a production activity.

Production activities include:

- living labor of people as an active part of production, which is the basis of the labor process. It is the workers who are the main creators of tangible and intangible goods;

- objects of labor on which a person works to turn them into an intermediate or final product in order to meet certain needs of consumers. In industry these are it's materials, blanks, raw materials, semi-finished products, i.e. all that is aimed at human labor;

- means of labor are part of the means of production (machinery, equipment, tools, equipment, etc.), by which a person affects the objects of labor.

Production activity (production function) is one of the functions of the enterprise. It is closely related to its other functions, i.e. financing, marketing, staffing, etc.

In addition to the concept of "production function" there is also a widely used concept of "operational function". The operational function includes all actions that result in the release of products and services supplied by the organization to the environment. This feature is inherent in any business. The specific content of the operational function can be determined by a set of separate, fairly autonomous activities of the enterprise, which are due to its creation, operation and development.

Enterprises (organizations) differ in the types of activities included in the operational function. Organizations that produce goods, as a rule, are material and energy-intensive, i.e. consume significant amounts of raw materials, semi-finished products, fuel and energy resources, etc. Such organizations include construction sites, machine-building enterprises, bakeries, etc. The products of these organizations, except for construction, are usually designed for the mass consumer - it's cars, vacuum cleaners, bakery products, etc. At the same time, service organizations (service enterprises, airports, bus stations, hospitals) consume a small number of raw materials and energy. However, their services are usually individual and determined by the requirements of customers (customers).

Using the methodology of the systems approach we can establish that every enterprise or organization is an open system that converts input values, i.e. raw materials, semi-finished products, labor and others into output, i.e. products, services.

The organization of the elements of production involves their effective placement in space and time. The organization of production aims at a rational combination of these elements to effectively solve the problems of production and profit.

It is well-known that the fundamental concepts of the organization of production include the productive forces. These are the forces and means involved in social production. The main element of the productive forces is the person who sets in motion the means of production.

The means of production include the means of labor (everything by which man acts on the material and spiritual world) and the object of labor (the object of human effort, everything from which products are made).

In the process of production and division of labor there are production relations among people, a kind of which is production and technical relations. The main purposeful, organizing, motivating and controlling body of production activity of the enterprise is production management, i.e. its management. Production management is one of the special functions of management, which is to plan, organize, motivate and control the production activities of the enterprise.

The organization of production is one of the functions of production management, which is carried out by specialists of production units of the management staff and ensures the streamlining of the processes of creation, development and production. The organization of production answers the question of how to organize the basis of business - its production system, and production management - how to make the production system efficient and ensure its rational use to achieve the goal of the enterprise.

2. The concept of operational management and the evolution of its development

Operational management is interpreted somewhat differently by many scholars and practitioners due to its versatility and the search for the most successful definition. It is common to associate operational management with production activities or physical changes in the condition of objects of labor. Therefore, it is most often defined as follows:

Operational management *is the activity of managing the process of purchasing materials, their transformation into a finished product and the supply of this product to the buyer.*

Many experts agree that this definition is quite generalized. It includes the functions of procurement, production and physical

distribution, which, although closely related to operations, are usually considered separate areas of research. In addition, this definition is relatively limited, as it does not allow any actions that are not related to material production.

Usually, all useful activities involve the processing of something. This can be, for example, the processing of information on the stock exchange, publishing or advertising.

Consumers (hotel business; hairdressing, travel, medical services, etc.) may be involved in the processing process. Operations on the processing of objects of labor, information are carried out in the structural (functional) units of the production enterprise, for example, in the planning and economic department, quality service, personnel department, labor and more.

A more precise definition, according to L. Galloway, is as follows: *"**Operational management** is all activities related to the deliberate transformation (transformation) of materials, information or customers."*

Operational management, according to this author is effective and efficient management of operations. It is emphasized that the degree of participation of physical goods in these operations is not important. In this case, the theory can be applied to the plant, factory, hospital or banking institution.

Similar to marketing and finance, operational management is a business area with clearly defined management functions. Operational

management is part of management, not one of the methods for decision-making in any field, so its managerial role distinguishes this area from other disciplines. It should be agreed with V.O. Vasylenko that, in fact, ***operational management*** *is synonymous with production management of the organization*. It is based on the management of production systems.

To confirm the above, we give another definition: "***Operational management*** *is a system of implementation of management decisions for the development, design, planning, control, maintenance and organization of production systems of the enterprise."*

The basis of production management is the management of the production system of the enterprise or organization. A production system is a system that uses production factors (resources) to convert the input factor introduced into its chosen product or service. The "input" of such a system can be represented by raw materials, the state of the customer or finished products obtained from another production system, as well as the customer (for the service, services) in need of service.

Thus, operational management can be considered as purposeful management actions for the development, use and improvement of production systems, on the basis of which the main products or services of the enterprise (organization) are manufactured.

The activity carried out in all organizations to create goods and services is called operational.

Operation is a process, type of activity or set of actions, usually of a practical nature. Operations are an integral attribute of human activity, which is characterized by organization and productivity. Therefore, all organizational functions are operations and management activities include operational management.

In management, it is believed that the terms of operation and production are interchangeable. However, "production" mainly means the production of goods and processing of raw materials. The term "operation" is broader, it includes not only the production of goods but also the provision of services. The operational function contains the actions that result in the production of goods and services supplied to the external environment. All organizations have the function of operations, otherwise they simply cannot exist.

Operational management *aims to achieve efficiency in the management of any operations*. In operational management, efficiency should be understood as a certain degree of achievement of the goals set by the operating system. For the organization, efficiency is the satisfaction of consumer needs.

3. Goals and objectives of operational management

The subject of the discipline of operational management is the study of scientifically sound forms and methods of managing the processes of creating an operating system and ways to ensure its effective functioning in different modes (regulatory, transitional).

Among the methodological foundations of the course "Operational Management" can be divided into two main concepts:

- *systems approach based on general systems theory;*
- *life cycle theory approach.*

The system approach involves the study of all components of operational management in the relationship and interaction in order to understand their structure, organization, identify patterns of development and improve management methods.

The system approach as a method of scientific research is based on the concept of system. A system is a set of interconnected elements aimed at achieving a specific goal. An element of a system is an object, phenomenon, or process that is part of a whole and that does not need to be separated into its component parts.

Life cycle theory approach is based on the idea that each object (product, system, etc.) goes through a number of stages in its development, some of which are repeated many times. The composition and sequence of stages of the life cycle is determined by the characteristics of the object and the nature of external conditions.

The main purpose of the operational system is to ensure a clear implementation of the production plan or the provision of services of established quality by the number of each range and at a given time on the basis of rational use of production resources, as well as by identifying and mobilizing internal reserves. The implementation of this goal requires a clear definition of specific tasks and measures for

their teams. The specific tasks to be solved within the current operation of the operating system include:

- complete and uniform execution of the production program with observance of terms of sending of production to consumers;

- full and rational use of means of production and labor resources;

- efficient use of working capital;

- development of modern forms of production organization;

- maintaining flexibility in production activities, which allows you to effectively adapt to environmental fluctuations;

- ensuring the optimal level of inventories, production and employment in accordance with the level of sales.

4. The process of implementation of operational management

Production management can be seen as the management of facilities or processes that manufacture goods or provide services.

This expansion of boundaries allows us to consider operational management more broadly, in relation to the management of any work and process. In addition to production, management theory should be applied to services, catering, public health, tourism, banking, trade, transport, hospitality, etc.

Operations are all productive activities both production itself and other activities related to the creative process.

Operational management is designed to ensure the efficient and rational conduct of productive activities in the field of production, and

any other related to the service. Therefore, all managers should be considered operational managers, as they must manage their departments so that they work efficiently and rationally, regardless of their function. In addition, operations are the basis of any manufacturing or service business and if the operational function is not performed effectively then the organization as a whole will not be able to succeed. Thus, knowledge of the principles of operational management will not only help management to work more effectively but also will better understand the principles of the entire organization.

The organization will not be able to retain market leadership without a rationally organized operational function, as it loses in the efficiency of delivery, price and quality. The main purpose of the enterprise is characterized by a chain "production - consumer needs"

Topic 2. Operational strategy

1. General characteristics of the content of the operational strategy of the enterprise

2. The essence of the operational strategy

3. Operational priorities

4. Working framework of the operational strategy in production

1. General characteristics of the content of the operational strategy of the enterprise

Operational strategy is one of the functional areas of corporate strategy. It is fundamentally important that in modern business all functional strategies (financial, operational, marketing, logistics, information, human resource management).

The overall strategy of the enterprise should take into account the strengths and weaknesses of the operational system through various functional strategies, strengthening the former and, if possible, eliminating the latter. In turn, the operational strategy should be a part of the overall strategy and other functional strategies. This requires that business leaders work in contact with all functional departments and develop strategies that do not conflict but complement and support each other.

At the functional level of integration, coordination of functional strategies with each other and with the overall strategy of the organization is difficult. Functional integration hinders the vision of a single goal of the enterprise and its implementation. The process approach to management and related operational and inter-organizational integration of activities allow to ensure the effective achievement of the goal and mission of the enterprise as a whole.

According to W. J. Stevenson, in the 1970s and early 1980s, American managers often neglected operational (production) strategies in favor of marketing and financial strategies. Decisions were often made by people unfamiliar with the case, and often to the detriment of the case. Meanwhile, foreign competitors have begun to fill the vacuum by focusing their efforts on operational strategy.

According to leading experts, the success of the company in the market by 20% depends on the correct strategy, 80% of success determines the implementation of the chosen strategy. In the implementation of the overall strategy of the enterprise, the operational strategy plays a major role, as it is related to goods, services and processes, as well as the organization of their implementation in all subsystems of the business operating system, covering all divisions of the enterprise. Thus, the operational strategy can have a significant impact on the competitiveness of the business. Without an efficient and streamlined operational system that develops according to the chosen operational strategy, no company can retain

market leadership because it loses in delivery speed, price, quality, or all indicators combined.

In ideal conditions, after the development of the overall strategy of the enterprise should begin designing the appropriate production facilities, business processes and business operational system that meets the requirements of the chosen strategy.

If the company already exists and its capacity more or less meets the requirements, the creation of new production facilities is unlikely. Managers often feel more comfortable if the operational system set up at the enterprise changes radically. As a rule, in such cases new technologies are introduced into the already existing process. Although the use of new technologies is generally welcomed by employees, it does not necessarily lead to the creation of competencies that could help to win potential customers. It is necessary not only to increase the number of new technologies, but also to restructure the operational system for the production of new products so that it differs and would be more efficient than those used by competitors.

From this point of view, operations and processes should be seen as a characteristic of the quality of work of the whole enterprise. Without a clear operational strategy and effective operational management, the company can survive only by accident.

2. The essence of the operational strategy

Operational strategy in the modern management literature is seen as a general policy and plans for the use of resources of enterprises aimed at the most effective support of their long-term competitive strategy. In some approaches, the operational strategy is considered to be a strategy that defines the principles of management of individual parts of the organizational structure and the value chain. According to some authors, the operational strategy should be considered as a strategy for the development of the operational system of the organization.

Most scientists consider an operational strategy in terms of long-term and stable operation of the operational system and its generation of products for markets with stable conditions and clearly projected demand.

So that an ***operational strategy*** *should be understood as a set of interrelated management decisions for the development of general policies and plans for the use of resources of the enterprise (organization), aimed at effectively supporting its long-term competitive strategy in terms of development of operational system.* The operational strategy, combined with the corporate strategy, should cover the full range of activities of the enterprise and involves a long process, which should provide the ability to respond quickly to any changes in the future.

Getting acquainted with the operational strategy, we will pay more attention to operations in production. At the same time, it should

be understood that operational strategies in both production and services have much in common and are, in principle, similar.

The operational strategy is to make decisions related to the development of the production process and the infrastructure needed to support its operation. The development of the process is to select the appropriate technology, scheduling the process over time, determining inventory, as well as how to place this process. Infrastructure decisions relate to planning and management systems, quality assurance and quality control methods, payroll structure, and organization of the enterprise's operational function.

Operational strategy can be considered as an integral part of the overall planning process, which ensures compliance of operational tasks with the objectives of a broader organizational structure. As such tasks tend to change over time, the operational strategy should also be developed taking into account possible future changes in the needs of buyers of the company's products. The operational capabilities of any enterprise can be considered as a portfolio of capabilities that are best suited to adapt to the demands of consumers of products or services of the enterprise.

To ensure their competitiveness, companies in different countries are guided by different priorities. The path to the success of an operational strategy is to identify as accurately as possible all possible priorities; understand what may be the consequences of choosing each

of the available options, as well as what compromises will have to be made in case of choosing one or another option.

3. Operational priorities

According to the early work of S. Wickham Skinner from Harvard Business School and later research Terry Hill from London Business School, the scientists distinguish several main types of operational priorities: production costs, product quality and reliability, lead time, reliability of supply, the firm's ability to respond to change in demand, flexibility and speed of development of new products, as well as specific criteria for each product.

Let's consider these priorities in more detail. In any industry, there is usually a market segment in which sales depend solely on how low the costs of the company will be. To compete successfully in such a market niche, a firm must be a low-cost producer, but this is a necessary but not sufficient condition and does not necessarily mean that the company will achieve a high level of profitability and success.

As a rule, consumers who buy goods of daily demand are simply not able to distinguish the same products produced by different companies, which leads to the fact that the main criterion when choosing a purchase is its price. However, more often this market segment is very large, and, in addition, many companies are attracted by the potential to make a significant profit, which is often associated with large volumes of production. As a result, competition in

segments of this type is usually very strong and fierce, and the percentage of bankruptcies is usually high. In such conditions, there can be only one producer with the lowest production costs, which usually determines market prices.

Another important priority is product quality and reliability. There are two separate categories of quality: product quality and process quality. The level of quality of each type of product varies depending on which market segment it is intended for. It is obvious that a children's two-wheeled bicycle must have a different quality than the car of a professional cyclist.

To ensure the appropriate level of product quality, it is necessary to take as a basis the requirements of consumers. It is obvious that excessively complex products with unreasonably high quality will not be bought because of its inflated price. On the other hand, the production of low-quality goods will lead to the loss of those potential buyers who prefer to buy a thing a little more expensive, but one that, in their opinion, has certain advantages.

The quality of the process is also extremely important, as it is related to the reliability of the product. No matter which bicycles the company makes - children's or cars for cyclists - consumers want the thing they bought to be free of defects. Thus, the main purpose of quality assurance in the manufacture is to produce goods without any technological errors or shortcomings. Requirements for the manufacture of a product are determined by its technical

characteristics specified in the size tolerances. To ensure the level of reliability of the product in accordance with its specific purpose, it is necessary to strictly adhere to these technical standards. In some market segments, the main condition for achieving competitive advantage is the ability of the company to produce products or provide services faster than others, i.e. the term of the order. Take, for example, a company that offers repair services for computer network equipment. A firm that is able to offer and perform such repairs on the client's territory within one to two hours has significant advantages over a competing company, which guarantees such repairs in just 14 hours.

The operational priority of "security of supply" is related to the company's ability to deliver goods or services exactly as promised. It is extremely important for any company, such as a car manufacturer, that its tire suppliers supply the required quantity of a given type of product on a daily basis. If the tires required to make a particular machine model are not available at the assembly line at a certain point where they are mounted, the entire conveyor may stop and stand until these components arrive. In addition, in the 80s and 90s of the last century, special attention was paid to the problem of reducing inventories, which led to a further increase in the role of security of supply as an evaluation criterion in the choice of suppliers of components.

4. Working framework of the operational strategy in production

The production strategy cannot be implemented in isolation, it must be related to consumers (vertically) and other elements of the enterprise structure (horizontally). Choosing a target market can be a very difficult task, but it must be solved.

The key operational capabilities, or area of competence, are the skills and techniques that distinguish a manufacturing or service firm from its competitors. The normal process of implementing a strategy is as follows: consumer inquiries about new products lead to the formation of priorities, which then become mandatory for operations.

Having determined the requirements for performance, the production unit of the enterprise uses all its potential, as well as the capabilities of its suppliers in order to meet these requirements. Enterprise capabilities include technology, systems and personnel. In each of these three industries, fundamental concepts and tools such as system of integrated management (SIM), total quality management (TQM) and the “just in time” principle (JIT) are used.

In order to reflect the fact that suppliers may be rejected if they have not passed certification testing in the field of technology, systems and personnel management, they also included a scheme (in the "cylinder") of operational capabilities. In addition, in determining the operational capabilities of the company in almost any case have to

make another important decision: to produce or purchase parts and components.

Today, world-class manufacturers usually ask questions about every element of production, for example: if we are not world leaders, say, in the field of metal stamping, should we do it at all or is it better to sign a contract with a contractor who will do it quickly and qualitatively?

For example, in the production of computer equipment, most manufacturers receive all components from external sources, leaving only the assembly and testing of finished products (recently, the approach is becoming more widespread, when even these operations are performed in the place where the product will be installed and operated as it provides higher quality work).

Perhaps the most difficult problem facing businesses is to abandon the traditional approach.

Topic 3. Operational system of the organization: structural and process characteristics

1. **System approach in operational management system**
2. **Operational system as an object of management**
3. **System hierarchy**

1. System approach in operational management system

A system approach in operational management system is understood as a way of thinking about organization and management, rather than a set of ready-made principles for managers. The local approach involves the study of a certain structure and functional features of its autonomous elements.

The system approach considers each object as a system and focuses on identifying different types of connections and combining them into a single system.

The systems approach is closely related to general systems theory. It is a methodology for the analysis and synthesis of objects of nature, science and technology, organizational and industrial complexes as systems.

A system is a set or combination of interconnected elements or parts that form a complex whole that interact in a certain way to achieve a given goal.

In the system approach, the organization is studied as a system, which is characterized by the unity of its structural and functional elements. Certain relations are established among the elements in the system. These relations and properties are a manifestation of the main principle of the system approach, i.e. the integrity of the system.

At the same time, according to the general theory of systems, the system approach involves the decomposition of the system, i.e. its division into individual elements, the study of their properties as elements of the whole.

One of these elements of the system is the operational system which acts as part of a whole that is separated by the social division of labor and has the ability independently or in conjunction with other systems to meet the needs of potential consumers through goods and services.

From the standpoint of a system approach, production is an important area of human activity, i.e. a complex system. Systems consisting of a set of interconnected objects are the national economy, industry, enterprise, shop, site. However, complex systems are complexes of functions, activities carried out in enterprises. As a single complex system can be considered all the activities of the enterprise, which consists of a network of subordinate less complex systems.

Operational systems are a special class of systems consisting of workers, tools and objects of labor and other elements necessary for

the functioning of the system, in the process of which products and services are created.

A manufacturing enterprise is a complex dynamic system, the elements of which interact with each other in a single process, create a beneficial effect and thus participate in the functioning of other systems.

Elements of the system are relatively separate parts of the system which not being systems of this type in their direct interaction create a system of a certain functional purpose. The elements of the operational system include labor, objects and means of labor.

There are two main types of systems: closed and open. A closed system has rigid fixed boundaries, its actions do not depend on the external environment. An example of such a system is a clock in which the interdependent parts move continuously and very clearly. And as long as the watch has a source of stored energy, it functions independently of the external environment.

An open system is characterized by interaction with the external environment. Such a system is not self-sufficient, it depends on energy, information and materials coming from outside. In order to continue to function, it must have the ability to adapt to changes in the environment. All enterprises, firms, organizations are open systems. The survival of every enterprise depends on the action of the environment.

The system has certain functions and it is characterized by them. (Figure 3.1) It means that all production dynamic systems are characterized by the implementation of the functions of processing, transmission, storage and management of information, energy and technological processes. The function of the system characterizes the manifestation of its properties in this set of relations and it is a way of operating the system when interacting with the external environment.

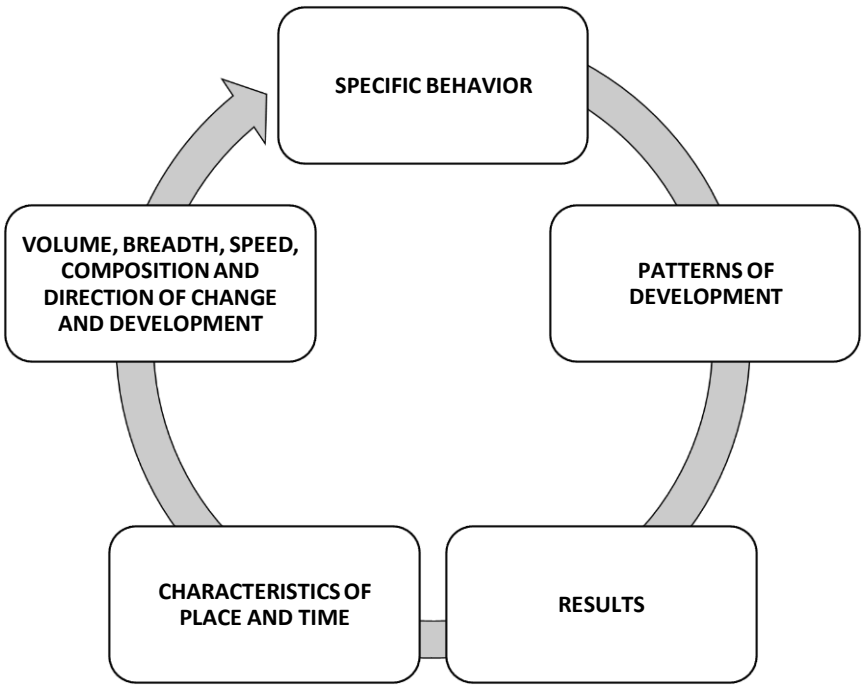


Fig. 3.1. Functions of the production system

The function of the system is a manifestation of its qualitative properties in interaction with other objects of systemic and non-systemic order. Changing external conditions causes a change in the

mode of operation of the system when it interacts with the external environment, i.e. leads to a change in the function of the system.

The function is the most variable, mobile side of the system. The structure of the system is more conservative before the changes. The structure of the production system is a set of elements and their permanent connections that ensure the integrity of the system and its identity to itself, i.e. the preservation of basic properties in various external and internal changes. The integrity of the production structure is one of the main properties.

All elements of the production system operate with a single common goal - the development, design and manufacture of the necessary products. Large components of the system, such as the production site, the shop often acts as systems themselves. They can, in turn, consist of smaller subsystems (crew, workplace). Thus, a subsystem is a set of interconnected and interacting elements that implement a certain group of system functions. The affiliation of the subsystem to a particular level of the system determines the existing set of defined properties.

The system is characterized not only by the presence of connections between its components (a certain organization of the system), but also inseparable unity with the external environment, in interaction with which the system reveals its integrity. Each system can be considered as a subsystem (element) of another system of higher order (“supersystems”)

2. Operational system as an object of management

The effectiveness of the organization depends on the correct choice of operational strategy. Depending on the strategy of the organization, the operational system is constructed.

Operational system is one of the components of every organization, within which the operational function is implemented, i.e. the process of production or provision of services to external consumers.

The operational system is considered as a set of interconnected subsystems (Fig. 3.2.)

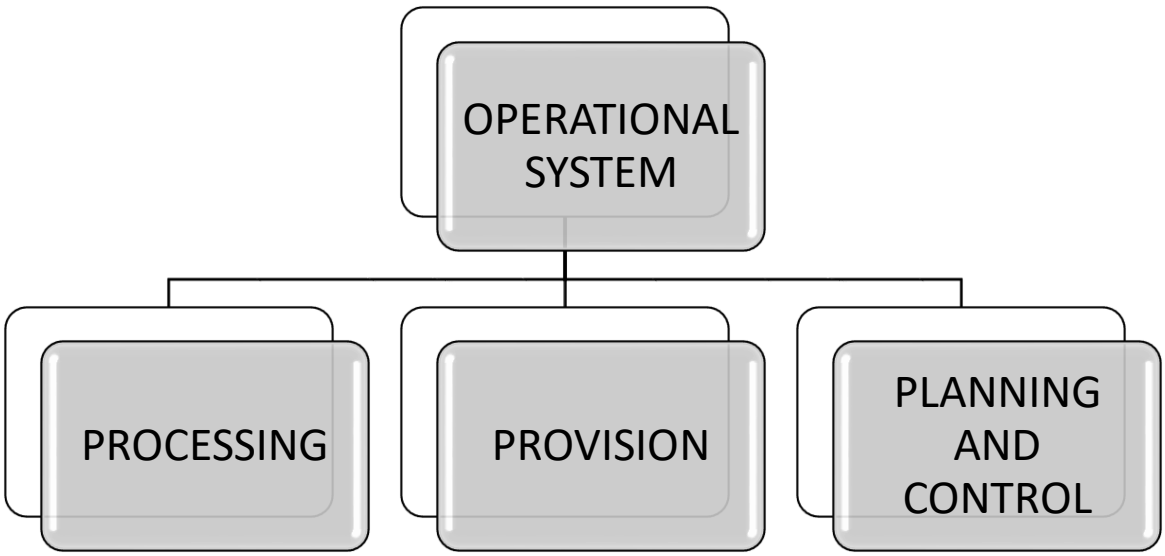


Fig. 3.2. Subsystems of the operational system

The processing subsystem carries out productive activities related to the conversion of input values into output results. All transformations of resources in the processing subsystem are carried out exactly according to the accepted technology, which in a broad sense means a combination of skills, equipment, infrastructure, tools and technical knowledge required to carry out the desired transformations in materials, information or people.

In essence, ***technology*** *is a way that allows you to convert input resources into the desired output*.

The supply subsystem is not directly related to the production, but performs the necessary functions to ensure the smooth rhythmic operation of the processing system. The subsystem of support includes auxiliary and service farms. The support subsystem itself consists of three lower-order functional subsystems (Figure 3.3):

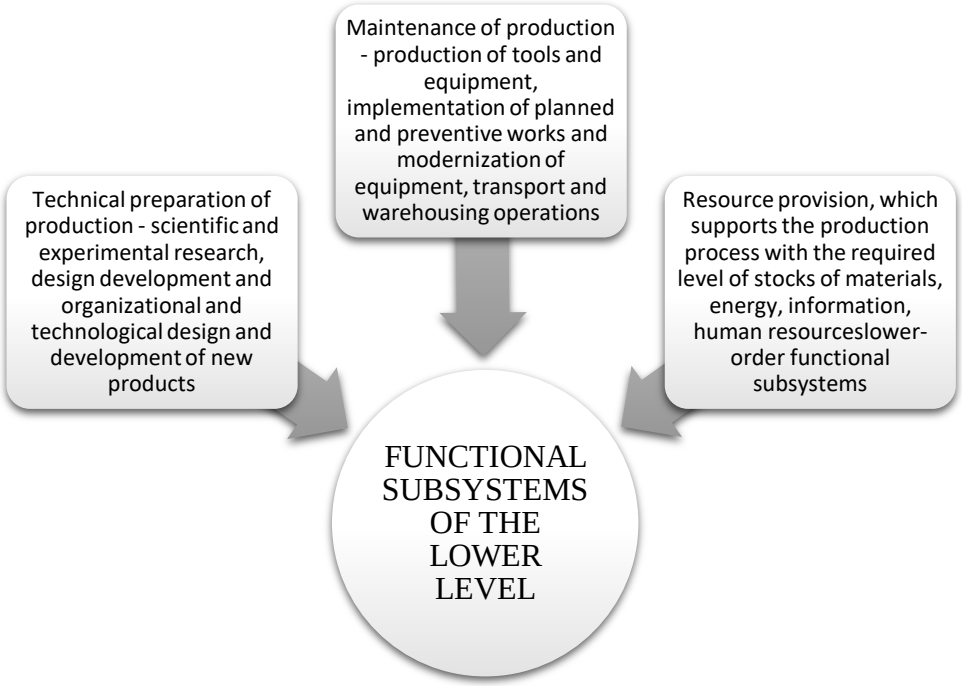


Fig. 3.3. Functional subsystems of the lower level

The planning and control subsystem receives information about the state of the system from the processing system. Information comes from the internal environment (about the goals, policies of the company, staff, etc.) and the external environment (about demand, cost of resources, trends in technology, legislation, competitors, etc.). This subsystem must process all the information and issue a decision on how the processing subsystem should work. Specific issues to be addressed include capacity planning, operational management, inventory management, quality control, etc.

The planning and control subsystem plans the activities of the organization for the next period, monitors the implementation of

decisions, determines the strategic directions of development of the organization.

3. System hierarchy

Let us consider in more detail the hierarchy of the operational system at the manufacturing plant. The individual components of the system (its subsystems), such as the production shop act as systems themselves. They, in turn, may consist of smaller subsystems (crew, unit, workplace). Thus, a subsystem is a set of interconnected and interacting elements that implement a certain group of system functions. The affiliation of the subsystem to a particular level of the system determines the existing set of defined properties. They determine the level (degree) of the hierarchy of individual subsystems as components of a system. All levels of the hierarchy can be divided into subsystems of a functional nature and as cybernetic systems have an object and a subject of control.

The system is characterized not only by the presence of connections between its components (a certain organization of the system), but also inseparable unity with the external environment, in interaction with which the system reveals its integrity.

Each system of a certain level of the hierarchy can be considered as a subsystem of a higher level system and at the same time as a system that includes elements of a lower level subsystem. In this case, each higher level of the hierarchy is a component of the external

environment for the lower, and the lower is a component of the internal environment for the higher. Multilevel (hierarchy) is a characteristic feature of complex systems. Individual levels of the system implement certain functions, and the integral functioning of the system is the result of the interaction of its elements of all hierarchical levels.

The complexity of the functioning and development of a system object is manifested not only in the fact that it consists of a large number of elements (many subsystems), but also in the fact that in the process of forming a complex system it is necessary to eliminate some contradictions at certain stages of system creation and development as well as at different levels of its functional and structural organization.

The production system is based on two concepts: product and production. They occupy a different place in the system: one is the result in the form of a product (product, service), the second is the activity aimed at its creation (process).

Topic 4. Production process

1. Production process. Components of the production process.

2. Production cycle

1. Production process. Components of the production process.

A process is a long-term action, a series of operations (activities) that are carried out on the original materials (process input), increase its value and lead to a certain result (process output).

The enterprises carry out various processes (production, economic, social, etc.) in various directions, methods of regulation and content, the set of which unites the components of the enterprise into a single system.

From the point of view of the system approach, the enterprise is considered as a certain integrity, which consists of interdependent parts, each of which contributes to the characteristics of the whole.

One or more production processes can be carried out at enterprises.

Simple (specialized) enterprises with one production process: production of homogeneous products from the same raw materials (small enterprises producing one type of product) (flour production).

Complex or combined enterprises with different production processes: a wide range of products is produced (meat processing, milk processing production)

The production process is the basis of all the activities of the enterprise, a set of interconnected partial labor processes, as a result of which the raw material is converted into finished products.

For example, the entire production process for milk processing consists of three stages (production phases):

1) primary processing of milk (mechanical cleaning, pasteurization, cooling and storage);

2) processing of milk into finished products (mechanical, thermal, chemical, microbiological and other processes);

3) packing and packaging of finished products.

The main condition for the implementation of production processes is the interaction of three elements, the optimal combination of which is the task of organizing the production process:

1) purposeful human activity;

2) means of labor (machinery, equipment, vehicles, buildings, structures, etc.);

3) items of labor (raw materials and materials that can be processed).

The production process consists of partial processes which, depending on participation in the production process can be divided into main and auxiliary.

The main production processes are production processes, as a result of which there are qualitative changes in the objects of labor (internal properties, appearance, shape, etc.). The main process determines the purpose (profile) of the enterprise. As an example of the main processes we can name certain stages of production: normalization of milk, carcass deboning, bread baking, caramel formation, filtration of wine materials, blending of wine materials, malting, etc.

The main processes include technological, natural, etc.

The technological process *is a formalized set of operations aimed at processing raw materials into semi-finished products and finished products.*

Technological processes are the basis of production technology.

Technology is the science of the most economical methods and processes of production of raw materials and products. By the nature of qualitative changes in raw materials and technologies can be physical, chemical and mechanical.

The natural process is carried out under the influence of natural forces on raw materials without human intervention. Such processes in food production are: flour maturation, dough fermentation, wine fermentation, cheese maturation, milk fermentation, cognac alcohol aging, malt cultivation, etc.

Human intervention in natural processes can accelerate (intensify) them. An example of such intensification is the transition

from classic production technologies to new (accelerated) ones: production of beer, champagne, hard cheeses, maturation of dietary products, sour cream, cured sausages, etc.

Auxiliary production processes create the necessary conditions for the main processes (providing production with material resources, repairing equipment, energy production, shipment of finished products).

The set of auxiliary processes is auxiliary production. The company's activities are ensured by a clear coherence of actions in the main and auxiliary production processes. The production process is divided into operations, which are the primary link in this process. An operation is a part of the production process that is performed at one workplace directly by one or more workers or under their supervision.

Execution of a production operation is characterized by the use of certain means of labor and is not interrupted by other work. A production operation is a part of the production process that is performed in the same workplace using the same means of labor with the same object of labor.

Partial labor process performs several operations at one workplace by a worker (group, workers). Work cycle includes several operations that are performed in one workplace. Production stage is one or more partial processes, as a result of which there is a transition of the object of labor from one qualitative state to another. For example, the stage of primary processing of milk consists of such

operations as: quality control of raw materials, acceptance, cooling, intermediate storage, cleaning, normalization, pasteurization and cooling, industrial storage of milk, washing equipment.

Production processes consist of a large number of heterogeneous operations that can be classified by purpose in the production process and by method of execution.

Basic operations make changes in the condition, shape, appearance of the object of labor. The main operations also include breaks in the processing of the object of labor, which are necessary for the course of natural processes. The set of basic operations creates a technological process.

Auxiliary operations, in contrast to the main ones, do not make changes in the subject of work, but create the necessary conditions for the implementation of basic operations. Auxiliary operations are moving, control and maintenance.

The duration of technological operations depends on the quality of raw materials. The duration of the operation is also affected by the method of its implementation.

Ensuring the efficient execution of production operations allows to solve the problems of reducing the production cycle, optimizing the structure of the production process.

2. Production cycle

The production cycle is the total duration of all time spent on work and breaks from the beginning of the manufacture of one choice (batch of products) to the end, which is repeated in full. The production cycle can be represented as the sum of two components: the working period and break time. The working period can be represented as the duration of technological operations, natural processes, transportation operations and control.

Breaks that determine the production cycle may be related to the mode of operation of the enterprise (duration of breaks between shifts, number of non-working days per week, and those caused by shortcomings in the organization of production processes, which include: state of production planning, compliance with productivity individual areas of production, poor organization of jobs and their maintenance).

The duration of the production cycle is one of the important economic indicators, which affects the volume of production, labor productivity and so on.

The duration of the production cycle (PC) is measured in units of working time (days, hours, minutes) and is determined by the formula 4.1 :

$$PC = (\Sigma t_{t.o.} + \Sigma t_{c.o.} + \Sigma t_{o.o} + \Sigma t_{br}) - \Sigma t_{sum} \qquad (4.1)$$

PC - duration of the production cycle;

$\Sigma t_{t.o}$ - duration of all technological operations as a part of one cycle;

$\Sigma t_{c.o.}$ - duration of all control operations as a part of one cycle;

$\Sigma t_{o.o}$ - duration of all organizational-technical and service operations as a part of one cycle;

Σt_{br} - duration of all regulated breaks as a part of one cycle;

Σt_{sum} - the duration of all compatible components of the production cycle.

In general, the production cycle is one of the most important indicators, which is the basis for calculating many other indicators for production and economic activities of the enterprise. On the basis of the production cycle, the terms of launching products into production are set, the capacities of production units are calculated, the volume of unfinished construction and some other indicators are determined.

Topic 5. Production strategy and competitiveness of the enterprise

1. Economic strategy of the organization and features of its development

2. Models of choosing options for economic strategy of the organization. The Boston Consulting Group (BCG) Matrix

3. The essence of the production strategy. Strategy and tactics in the system of operational management. Operational priorities

1. Economic strategy of the organization and features of its development

Strategy is the art of leading a certain organization. The most significant features of the organization's strategy are:

- it develops senior management, but implementation involves all levels of government;
- it aims at the prospects of development of the whole organization;
- it should be based on extensive research and factual data (collection and analysis of data on industry, market, competition);
- it gives the firm certainty, individuality in terms of selection and attraction of resources;
- it must be integral for a long time and at the same time flexible
- it can be modified and reoriented if necessary.

The need to develop a strategy for the organization:

- provides management with the basis for creating a plan for the long term;
- provides a basis for management decisions;
- allows you to determine the main directions of action;
- helps to reduce risk in decision making;
- helps to ensure the unity of the common goal within the organization.

The strategy is developed in several stages, i.e. the process of developing a plan; adjustment of planned tasks; making changes and additions.

Formation of a strategic plan is a careful, systematic preparation for the future.

The first step is to define the mission of the organization. Mission is a super-task that determines the feasibility of its existence, describes the space of activity in terms of production (services) and market place.

Basing on the mission of the organization the general goals are formed. They specify the mission. After defining the mission, goals, analysis of the external environment, it allows those who work out a strategic plan to control external factors in relation to the organization, to identify opportunities and threats to the company.

The next step of the management survey is a methodical assessment of the functional areas of the organization in order to determine its strategic strengths and weaknesses.

By aligning internal strengths and weaknesses with external threats and opportunities, management can begin to choose the appropriate strategic alternative.

2. Models of choosing options for economic strategy of the organization. The Boston Consulting Group (BCG) Matrix

The BCG matrix performs two functions:

1) allows you to distribute strategic funds between strategic areas of management in the future;

2) allows you to make decisions about achieving the desired market position based on the analysis of Threats, Opportunities, Weaknesses and Strengths.

The matrix is based on two indicators:

- the volume of demand (growth rate of production) is the total level of sales, the ratio between the level of supply and demand at the moment in a particular market;

- the market shares of the enterprise relative to its main competitor in the industry is the share of the firm among other potential rival firms of the same profile;

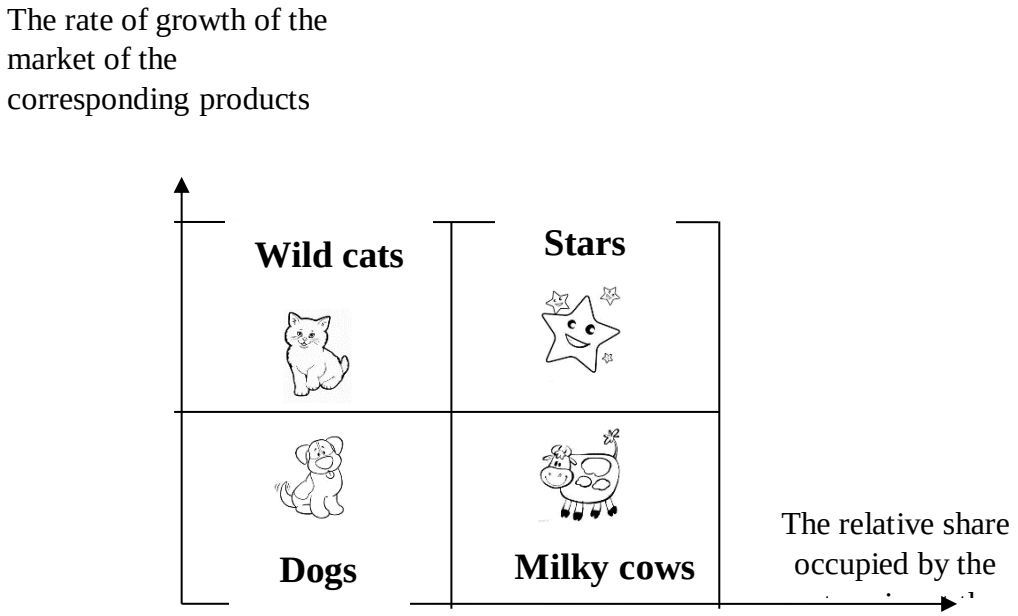


Fig. 5.1. The BCG Matrix

Quantitative and qualitative parameters of the future growth rates and market share are determined for each economic zone. These data fit into the corresponding quadrants of the matrix. Economic zones are given a conditional name:

- "stars" are characterized by high growth in demand and high market share;

- "wild cats" mean high growth in demand and low market share;

- "dogs" determine the low growth in demand and low market share;

- "milky cows" show low growth in demand and high market share.

The "wild cat" zone is characterized by high demand and low market share compared to the main competitor. There are opportunities to increase production, significant investment is needed, and this is risky. Special research is needed to establish an appropriate strategy for achieving star status.

The "star zone" brings together high-demand businesses that control significant market share. In this situation, it is necessary to follow a growth strategy, introducing technological innovations.

The area of "milky cows" has a low volume of demand, a high market share of the seller compared to the main competitor. It is necessary to control investments, transfer the excess funds from sales under the control of senior management for use in other areas of activity.

The dog zone covers a group of enterprises with low demand and low market share. Strategic decisions can be as follows:

1) the transition to a related industry and an attempt to succeed there;

2) modernization, re-equipment, change of product range;

3) sale at auction, the strategy of getting rid of excess.

In practice, the BCG matrix is used in conditions when the country's economy is developing stably, without sharp fluctuations in market conditions.

Porter's competitive strategy model.

This is a model of strategy selection in a competitive situation. Its task is to prepare the company for a state in which it can take full advantage of its competitive advantages. The focus is on competition analysis, which involves the selection of 4 diagnostic components.

3. The essence of the production strategy. Strategy and tactics in the system of operational management. Operational priorities

Production strategy is to develop a general policy and plans for the use of resources of the firm, aimed at the most effective support of its long-term competitive strategy. Production strategy in conjunction with corporate strategy covers the full range of the company's activities and allows for a long-term process designed to provide the company with the ability to respond quickly to any imminent changes in the future.

Production strategy is a subsystem of corporate strategy, presented in the form of a long-term program of specific actions to create and implement a product of the organization. This subsystem involves the use and development of all production facilities of the organization in order to achieve a strategic competitive advantage.

Production strategy is expressed in making decisions related to the development of the production process and the infrastructure needed to support it. The development of the process consists of choosing the appropriate technology, drawing up a time schedule of

the process, determining inventories, the method of placement of this process. Solutions are related to infrastructure, planning and management systems, methods of quality assurance and quality control, the structure of remuneration and the organization of the production function of the company.

The criteria for implementing the strategic plan are shown in Fig.5.2:

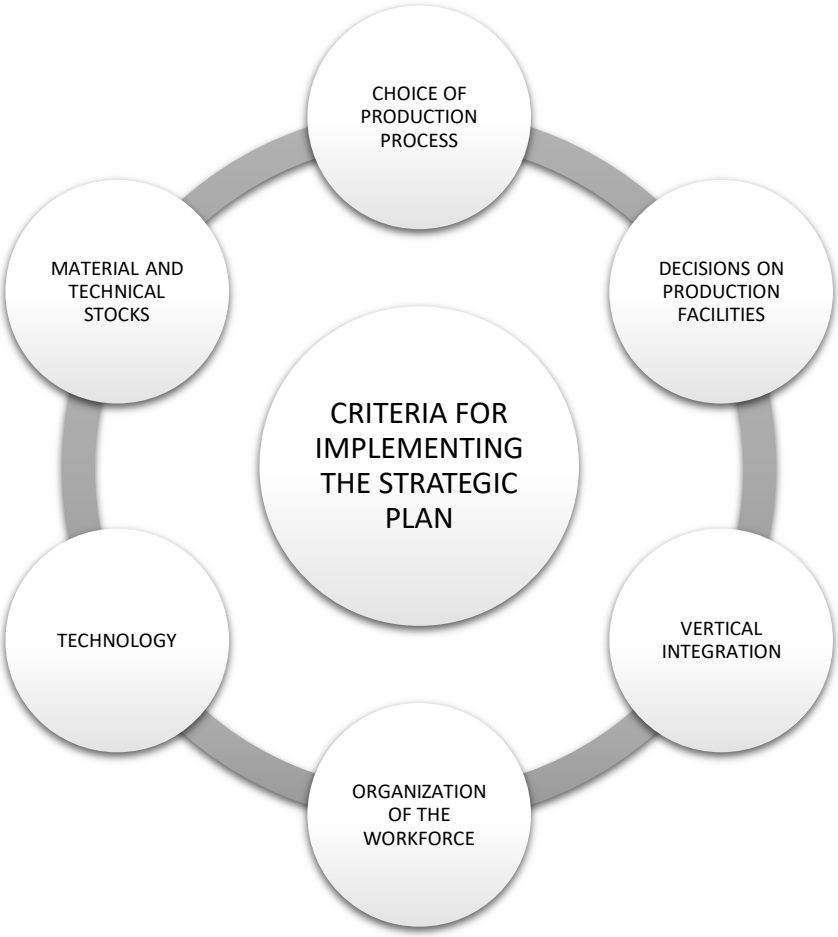


Fig. 5.2. The criteria for implementing the strategic plan

The company's strategy is to provide products and services through the operational function to meet the needs of consumers.

Tactics is a way of current organization of management functions, which provides a phased and ongoing implementation of operating system strategies.

Topic 6. Planning and projecting in the operational process of the enterprise. Project Management

1. Projecting the operational system of a manufacturing enterprise

2. The main stages of projecting of the operational system

3. Projecting of products and fulfilment of the production processes

4. Projecting the process of production or provision of services

5. The essence of the project approach. Project planning

1. Projecting the operational system of a manufacturing enterprise

When studying the projecting of production systems, it is advisable to identify three interrelated aspects:

1. Production aspect. The activity of the enterprise is evaluated in terms of the implementation of its production program. The enterprise program is divided into subroutines. The production aspect is of importance because:

- according to production indicators (quality and volume of products, the level of costs of the enterprise, the received profit) the activity of the enterprise is planned and estimated;

- the organization of production and the structure of the enterprise are determined primarily by the technology of production;

- most of the important studies of the impact of scientific and technological progress is carried out in terms of production of the enterprise.

2. Structural and organizational aspect. The organizational structure of the enterprise must meet the requirements of rational division of labor. In this aspect, we can identify the following subsystems:

- main divisions (direct transformation of objects of labor);
- auxiliary units (other production processes);
- research, development and technological work;
- enterprise management (management of production processes, planning, accounting).

3. The aspect of efficiency concerns the problem of choosing the criteria for assessing both product quality and the activities of individual production units of the enterprise.

It is necessary to distinguish two sides of this aspect:

- the intensity of the impact of subsystems that determine the efficiency of production on certain types of products;
- the possibility of the influence of individual structural units of the enterprise on the subsystems that determine the efficiency of production.

Design of the operational system is considered at the higher levels of the enterprise, as well as the type of product to produce, the production processes, capacity, and sometimes logistics.

Management is crucial, because the efficiency of the operational system depends on the quality of management decisions.

2. The main stages of projecting of the operational system

Collection of analytical and information data involves the collection of operational and technological, accounting and economic and other information that reflects the course of the production process, the state of supply systems, quality, production logistics.

Sources of data collection:

- technological documentation (route, operational and operational-instruction technological maps, which are used depending on the type of production, special technical control maps);
- accounting and economic documentation provided by the planning and economic department and accounting. Evaluation of this documentation makes it possible to analyze the state of the enterprise and its readiness (availability of necessary resources) for change.

The collection of information is carried out together with:

- constructing a model of the organizational structure of operational system management, which provides hierarchical links and information flows. It clearly shows the subordination and functions that are duplicated, i.e. it can be reduced;

- formation of a complete list of works performed in the management system, which allows their logical grouping, ranking, while determining the need for resources and time to perform them. On the basis of these analytical data it is possible to define expediency of performance of each of task and to fix them on concrete divisions.

The sequence of actions of the operational manager (management decisions):

- goal setting;
- determining the need for information on the blocks of the operational system (collection of information about the production process, functioning of the supply system, quality system, logistics system, management system);
- separation and evaluation of operational information;
- separation and evaluation of analytical information;
- creation of a single database (on electronic media);
- assessment of the reliability of the received information;
- elimination of incorrect and duplicate information;
- formation of a new database;
- assessment of the completeness of the received information;
- making changes;
- result.

3. Projecting of products and fulfilment of the production processes

Production project is aimed at meeting the needs of the consumers. Analysis of specific consumer requirements for the product is carried out according to the following product design criteria: cost, quality, efficiency, luxury elements, size, power, strength, service life, reliability, service requirements, simplicity, versatility, safety, etc.

The sequence of actions of the operational manager (management decisions) in the design of products: selection of the product to be produced; demand assessment; calculation of product development costs; forming a list of all components of the product; development of the list of all functions of a product taking into account inquiries of the consumer; identification of the main and possible alternative functions of the product and the cost of them, from which several are selected with the lowest cost; analysis of possible implementation and costs; the best option is chosen; development of a detailed project; conclusion on the feasibility, cost-effectiveness and efficiency of the product.

Projecting the production process according to which the product will be manufactured involves determining its stages and time of work. It is important at this stage to pay attention not only to technological processes, but also to logistics, control and other auxiliary processes of the "production" system.

Criteria for designing the production process: production capacity, cost-effectiveness, flexibility, productivity, duration,

reliability, standardization and sustainability of results, safety, industrial sanitation, hygiene, meeting the physical needs of workers.

Projecting of the operational system capacity. Capacity means the maximum volume of production for a certain period of time. Determining the required capacity, the existing demand must take into account. The accuracy of the calculation of it depends on the accuracy of the level of required capacity.

Among the common methods of forecasting the required capacity there are first of all the trend. The trend is easily determined using the analysis package MS Excel. Today, most industrial workers choose to work with this program as quite simple and easy to use.

Projecting the production operations means development of working schedule and calculations of the use of production resources.

Projecting of production operations involves: goal formulation; development of personnel tasks; division of works into operations; determining the required execution time of operations; determination of waiting time and downtime; optimization of operations in time; development of work schedule; determining the quality of operations; development of a calendar plan.

Among the most important aspects of projecting of the operational system are:

- projecting of works, which includes the exact definition of the content of each type of work, their distribution among employees, determining the degree of specialization.

- rationing of labor, which is to establish the necessary cost of working time to perform the operation.

The main stages of product projecting. Product projecting should be aimed at meeting the needs of the buyer. In its day-to-day operations, the company is obliged to monitor the demand for each type of product produced, as well as to monitor changes in the product offer of competitors and production technology. A quick response to the state of market demand forces the company to purposefully search for new ideas and new products.

The main stages of designing a new product:

- analysis of forecasted needs in products;
- search for a new product idea;
- preliminary evaluation of the idea and selection of the most acceptable way of its implementation;
- research of consumer properties of a new product and preliminary market analysis;
- selection of criteria of the designed product according to market requirements;
- determination of the necessary properties of the product based on the choice of alternatives to the design characteristics;
- studying of the peculiarities of the production process and the possibility of adapting a new product to the existing conditions of the enterprise;
- new product projecting;

- production process projecting;
- organization of experimental production and trial sales;
- transition to mass production and implementation of a comprehensive marketing program.

At the end of each stage, a comprehensive review of the results is achieved, on the basis of which it is possible to return from any following stage to any previous stage with the repetition of the above procedures. Thus, these actions are iterative.

Work at different stages can be combined or carried out in parallel. Therefore, in the course of working on the product, flexibility is needed to re-evaluate the results obtained, and sometimes to change the ideas underlying the solution.

Factors to consider when projecting a service:

- buyer's participation;
- inability to store services;
- variability in demand for services;
- industrialization in the development of services means removing the customer from production;
- quality of service;
- service efficiency;
- the buyer can be seen as a workforce (self-service process);
- possibility of flexible use of labor (use of part-time work schedule);
- automation of service provision (vending machines);

- centralization of service delivery processes.

4. Projecting the process of production or provision of services

When the product is projected it is necessary to determine the stages of the production process of this product, the total duration of its manufacturing. Different variants of the technological process affect the average production time, the complexity of manufacturing products, freight flows at the enterprise, the use of production capacity.

The greatest effect will be achieved if complex technological processes are developed, covering, in addition to the main production operations, transport, control and other auxiliary processes. In this case, even before the production process on the technological documentation it is possible to determine the length and direction of transport routes between technological operations, duration of transport operations. The relevance of this approach is dictated by the fact that, as a rule, the volume of auxiliary operations often exceeds the volume of the main.

As with product project, the process developer (technological service of the enterprise) must consider the relative importance of the following criteria for designing the production process: production capacity; economic efficiency; flexibility; productivity; duration; reliability; standardization and consistency of results; safety,

industrial sanitation and hygiene; meeting the living needs of employees.

To ensure the desired characteristics of the process, the designer must choose from several options in the following areas:

- type of processing system (design system, small-scale production, continuous process, combination of the listed options);
- own production or purchase of some components;
- performance of some tasks by own means or their transfer to subcontractors;
- methods of processing (for example, painting of products can be conducted by spraying, a brush, the platen, immersion);
- degree of mechanization and automation;
- level of auxiliary works;
- degree of specialization of workers.

Specialization (division) of labor is the most important factor in increasing the productivity of production workers and workers.

Advantages of specialization:

- reduction of training;
- raising the level of professional skills in each specialized workplace;
- separation from production tasks of those that do not require skilled labor, but can be performed by unskilled workers who receive lower wages;
- increasing the possibility of using specialized equipment.

The main disadvantages of specialization:

- reduction of flexibility when production tasks change;
- reduction of workers' satisfaction with their work;
- increasing fatigue during monotonous work;
- increase in the number of absenteeism.

The role of the manager at the stage of determining the content of work is very important.

Projecting the production process, the main focus is concentrated on the individual processes through which materials or components pass during manufacture.

The most widely used points in the process planning are:

- operational route maps (routes of movement of preparations on operations of technological process);
- assembly diagrams and drawings (detailed image of all individual components of the product);
- schemes of technological process (display by means of standard symbols of everything that occurs with production in the course of its consecutive manufacturing on the corresponding production equipment).

After the development of the technological process as a whole the process of projecting of its individual stages begins. In more detail, the process is divided into three components: a set of tasks; flows of materials and information that combine these tasks; storage of materials and information.

At the initial stage of the product life cycle, its sales are quite low. The design of the product may not be quite stable, and competitiveness is based on its distinctive features, not on price. At this stage, the production process must be flexible enough so that it can be quickly changed and improved in accordance with demand and changes in product design. The company's ability to produce products in large quantities and with high economic efficiency is the main task at this stage. The production process at this time is usually quite time consuming, not sufficiently automated. In the process of product improvement, its design will be increasingly standardized and sales will increase. The main factor of competitiveness will be the price. The production process will be highly mechanized and will acquire signs of mass production.

5. The essence of the project approach. Project planning

A sequence of interconnected operations, usually aimed at achieving a specific significant result within a given time with set resource constraints, is called a project.

Project management is the art of managing human and material resources throughout the project life cycle, carried out using a system of modern management methods and techniques in order to achieve certain results in terms of composition and scope of work, cost, time, quality and satisfaction of project participants.

Project management is the main form of planning and control of current activities of the enterprise.

The purpose of the project is the desired and reasonable result that must be achieved within a certain period and under the given conditions of the project.

The formulation of the purpose of the project involves the justification of the task, which requires:

- determination of results of activity for a certain term;
- quantitative evaluation of the results of this activity;
- proof that these results can be achieved;
- identification of the conditions under which these results can be achieved.

Project participants are legal entities and individuals who are obliged to perform certain actions provided by the project, and whose interests will be involved into the project.

The main participants of the project may include: the initiator of the project; customer (owner); investor; project manager, project team; general designer, designers; general contractor, subcontractors; suppliers; legal, consulting, engineering companies; authorities; landholder; people; buyers of final products; competitors; other stakeholders.

The project approach is to form a team with a high degree of motivation to work at a specific project. The success of every project

largely depends on how the project team works and how well the work and project management are organized.

Project management can be described as a procedure for planning, allocating and regulating resources (labor, material and equipment), taking into account all the limitations of the project (technical, budgetary and time).

The main sources of project funding are:

- own financial resources (profit, depreciation deductions, funds paid by insurance bodies as compensation), as well as other types of assets (fixed assets, land, etc.) and borrowed funds (funds from the sale of shares, charitable or other contributions, funds allocated) higher-level holding or joint-stock companies, industrial and financial groups on a gratuitous or preferential basis);
- allocations from the public, regional and local budgets, the business support fund provided free of charge;
- foreign investments provided in the form of financial or other participation in the authorized capital of joint ventures, as well as in the form of direct monetary contributions of international organizations and financial institutions, states, enterprises and organizations of various forms of ownership;
- various forms of borrowed funds, in particular loans granted by the state on a reciprocal basis; loans to foreign investors; bond loans; loans from banks, investment funds and companies, insurance companies, pension funds; promissory notes, etc.

An important component of successful project implementation is project cost planning. All project participants (suppliers, banks, contractors) must take into account the cost indicators of the project when planning. The project estimation is used for this purpose.

The estimation means a set of documentary calculations necessary to determine the amount of project costs. The estimation has a dual function: on the one hand, it is a document that determines the cost of the project, and on the other hand, it is a tool for monitoring and analyzing the cost of funds and resources for the project.

Effective project management is a complex process. It requires a clear division of responsibilities for the implementation of certain works, a clear system of timely reporting on the progress of the project and effective personnel management.

Project planning may involve the creation of appropriate project organizations within the enterprise to perform work that goes beyond the normal management of the operational system.

The composition of the project executors is temporarily assigned to the project and it is notified by the results of work at the top management level.

Project managers have the opportunity to use extensive information at the enterprise and monitor the progress of the project.

Each project begins with a list of works (Statement of Work - SOW). This is usually a brief description of the main tasks of the project with a list of all operations to be performed, start and end dates

of these operations. The list of works also includes budget requirements at each stage of the project and a list of written reports to be provided during its implementation.

The next element that is introduced into the project is a working task. It takes no more than a few months and is performed by one group. Sometimes, if there is a need to present the project in more detail, the task is divided into several subtasks.

The working task is a set of operations that are grouped together and performed by a single organizational unit. This element is also included into the general structure of the project: it provides a description of operations to be performed within this package of works, indicates the dates of their start and end, budget requirements and performance criteria, as well as highlights the stages of work performed in certain periods of time. Typical stages are project development, production of a prototype, completion of tests of a prototype, manufacturing and acceptance of the test results.

The Work Breakdown Structure (WBDS) is a hierarchy of project tasks, subtasks and working tasks. Execution of one or more subtasks leads to the task; completion of all tasks means the end of the project.

For high-quality development of the project structure, it is recommended to follow the following recommendations:

- striving to ensure that the implementation of each element of the structure can be worked independently;

- ensuring that the dimensions of the structural elements allow them to be managed effectively;
- distributing the powers related to the implementation of each element of the project;
- monitoring the progress of the project;
- providing all necessary resources.

To implement a project, senior management must decide which of the three organizational structures will be used to link the project to the organizational structure of the enterprise: a separate, matrix or functional project.

A separate project (Pure Project) is characterized by the fact that a specific group of specialists is constantly working on a specific project.

Advantages of a separate project:

- the project manager receives all the powers related to its implementation;
- team members report to one leader, they do not have to worry about the loyalty of the functional manager;
- the procedure for exchanging views is significantly reduced, as a result of which decisions are made much faster.
- concepts such as team pride, motivation and dedication are very important.

Disadvantages of a separate project:

- concentration of resources. Equipment and personnel cannot be used in various projects;
- the organizational goals and policies of the enterprise are ignored, as group members often move from one unit to another, both psychologically and physically.
- due to the weakening of the connection of functional units, the company is late with the development of new technologies;
- as group members do not have a “native” functional area, they are concerned about what they will do after the project is completed, which often leads to delays.

Functional Project is characterized by the fact that the project is implemented in existing functional units.

Advantages of the functional project:

- project team members can work on several projects simultaneously;
- technical experience is retained within a specific functional area, even if the project participant leaves the group or resigns from the organization;
- the functional area remains "native" for the project team members even after the project implementation. Functional specialists can move up the service.

As a result of the saturation of the group with highly professional specialists from several functional areas, the efficiency of solving various technical problems related to the project increases.

Disadvantages of the functional project:

- insufficient attention is paid to aspects of the project that are not directly related to a specific functional area;
- team motivation is often very weak;
- the client's needs are secondary, the response to them is slow.

Network planning methods: advantages and disadvantages

Today, a large number of graphical computer programs have been created thanks to which the management of enterprises, customers and project managers have the opportunity to choose from a variety of options for presenting the process of monitoring the project.

Network methods are used to plan project works and control their progress.

The most well-known methods of drawing up a network schedule:

PERT (Program Evaluation and Review Technique is a method of evaluation and review of programs) and CPM (Critical Path Method).

Using PERT and CPM methods, you can present the project in graphical form. Its individual tasks are interconnected so that the main focus is on the most important points for the project.

The structure of PERT and CPM consists of five steps:

1. Identify the project and all its main works or tasks.

2. Establish all connections between works: determine which works should precede and which should follow the considered works.

3. Develop a network that contains all the work.

4. Determine the time and monetary costs associated with each job.

5. Determine the critical path, i.e. calculate the longest path on the network from the beginning of the project to its end (critical path).

6. Use the network to implement the plan, work schedule, management and control of project development.

5. Determining the critical path is an important part of monitoring the progress of the project, representing tasks, the delay in which leads to a delay in project implementation. Managers enjoy the flexibility of project management through work that lies in non-critical ways, allowing, within certain limits, the ability to make changes in planning, work schedules and redistribution of human and financial resources.

In their basic forms, the PERT and CPM methods were designed to determine the longest path in the sequence of works (critical path), which becomes the basis for planning and monitoring the progress of the project. Lines with arrows and nodes are used to graphically display this sequence in both methods. Although PERT and CPM differ slightly in terminology and network construction, their

techniques are the same. The analysis used in both methods is very similar.

The use of PERT and CPM methods is extremely important, as they can help answer questions about a project consisting of thousands of works:

When will the project be completed as a whole?

What jobs or tasks are critical in the project?

Which work delay determines the delay in the project as a whole?

Which works are not critical?

What is the probability that the project will be completed by a specific date?

If the project is to be completed in a shorter time, what is the way to ensure its completion at the lowest cost?

With the practical use of information systems for project management, various software products are widely used, which can significantly increase the speed of all processes related to project management.

Topic 7. Management of material resources

1. The essence of stocks

2. "Extracting" and "pushing" operational management systems

3. Stock management systems and its main types

1. The essence of stocks

Stocks are products of industrial and technical purpose, which are at different stages of production and circulation, consumer goods and other goods awaiting entry into the process of industrial or personal consumption.

As a rule, stocks are a reserve of material resources of the enterprise.

Despite the fact that the maintenance of stocks is associated with certain costs, entrepreneurs are forced to create them.

The main motives for creating stocks are:

- Probability of violation of the established schedule of deliveries (unforeseen decrease in intensity of an incoming material stream). In this case, the stock is necessary in order not to stop the production process, which is especially important for companies with a continuous production cycle.
- The possibility of fluctuations in demand (unforeseen increase in the intensity of the output flow). Demand for any group of goods can be predicted with high probability. However, it is much

more difficult to predict the demand for a particular product. Therefore, if you do not have a sufficient stock of this product, there may be a situation where effective demand will not be met.

- Seasonal fluctuations in the production of some types of goods. This mainly applies to agricultural products.
- Discounts for the purchase of a large consignment of goods can also cause the creation of stocks.
- Speculation. The price of some goods can rise sharply, so a company that has managed to anticipate this growth. The stock is created in order to make a profit by raising the market price.
- Costs associated with placing an order. The process of registration of each new order is accompanied by administrative costs (search for a supplier, negotiations with him, business trips, long-distance negotiations, etc.). These costs can be reduced by reducing the number of orders, which is equivalent to increasing the volume of the party being ordered, and, accordingly, increase the size of the stock.

Possibility of uniform implementation of operations on production and distribution. These two activities are closely connected: what is produced is shared. If there are no stocks, the intensity of material flows in the distribution system varies according to changes in production intensity. The presence of stocks in the distribution system allows the implementation process to be more even, regardless of the situation in production. In turn, the availability

of inventories smooths fluctuations in the supply of raw materials and semi-finished products, ensures the uniformity of the production process.

Possibility of immediate customer service. You can fulfill customer orders as follows:

- make the ordered goods;
- buy the ordered goods;
- issue the ordered goods immediately from the available stock.

The latter method is usually the most expensive, as it requires keeping a stock. However, in conditions of competition, the possibility of immediate satisfaction of the order may be crucial in the struggle for the consumer.

The stock allows to minimize downtime due to lack of spare parts. Equipment failures and various accidents can lead to a stoppage of the production process in the absence of spare parts. This is especially important for companies with a continuous production process, as in this case, stopping production can be expensive.

Creating of stocks leads to simplification of the production management process. We are talking about the creation of stocks of semi-finished products at different stages of the production process within the enterprise. The presence of these stocks allows to reduce the requirements for the degree of consistency of production processes at different sites, and, consequently, the corresponding costs for the organization of management of these processes.

These reasons indicate the need to create stocks in logistics systems. At the same time, a feature of the direct logistical approach to inventory management is the rejection of the functionally-oriented concept in this area.

1) In the theory of stock management there are the following types:

- stocks by place of production:
- stocks of material resources;
- stocks of works in progress;
- stocks of finished products;
- stocks of containers;
- stocks of returnable waste.

2) Regarding basic logistics activities:

- stocks in supply, material resources that are in the supply chain from suppliers to warehouses of material resources of the manufacturer, designed to ensure the production of finished products;
- production stocks, stocks of material resources and work in progress, which came to consumers and were not processed, are in enterprises of all branches of material production, intended for industrial consumption and allow to ensure the continuity of the production process;
- commodity (sales) stocks, stocks of finished products, transport stocks, which are in the warehouses of finished products of the

manufacturer and in the distribution network, designed to meet consumer demand (sales);

- total stocks are the object of optimization of logistics management in terms of total costs and include all of the above types of inventories.

2. "Extracting" and "pushing" operational management systems

Every production requires the constant monitoring of the entire production process by the operational manager in order to ensure its required productivity. If possible the operational manager tries to improve it. One of the tools to use in the process is the system of operational and calendar planning.

Under the ***system of operational and calendar planning*** one understands the methodology and techniques of planning of works, which are determined by the degree of centralization. The choice of planning and accounting unit, differentiation of planning periods, composition and accuracy of calendar and planning standards, as well as composition, design and movement of planning and accounting documentation are also determined by the operational manager.

When organizing the movement of material flow in the planning process there are two approaches:

1) Planning systems: movement of material flow based on the principle of ejection of semi-finished products out of the

manufactured products. With this approach, it is difficult to rebuild the operational process when demand changes. Using this system, even during the month, it is necessary to change production schedules several times for all technological stages.

The disadvantages of this system include the following:

- it is very difficult to take into account, evaluate and adjust the material flow;
- the process accounting for each group of resources requires complex and expensive information, software and logistics;
- limited availability of material stocks, installation of redundant equipment, involvement of additional employees in case of malfunctions.

2) Planning systems based on the principle of extraction of semi-finished products from the previous operation to the next during the entire manufacturing process. Using this approach, the central management system does not interfere in the exchange of material flows between different technological sections of the enterprise, does not set for them current production tasks. The production program of each separate technological link consists of the size of orders of the next technological link. The main function of the control center is to set the task before the final technological link.

The advantage of such systems is that they do not require general computerization. But at the same time, they provide high discipline

and compliance with all parameters of supply, as well as increased responsibility of performers at all levels.

The main objectives of the extraction systems:

- preventing the spread of fluctuations in demand or output of the next process from the previous one;
- minimization of fluctuations of parameters between technological operations;
- maximum simplification of material resources management due to its decentralization;
- maximum increase in the level of operational shop management.

After the World War II, just-in-time (JIT) production systems were developed in Japan. They were used to modernize the production of high-quality goods and services and combined 5Ps of operational management. All manufacturing companies that apply the concept of total quality management (TQM), in fact, simultaneously use in their activities, at least some elements of JIT.

The JIT system is the only set of measures taken to achieve large-scale production using minimal inventories of parts and components, semi-finished and finished products. The parts arrive for the next operation "just in time" and they are processed and quickly go through this operation. The method "just in time" is based on the logistical concept - "nothing will be produced until it is necessary."

The "just in time" supply system in the relevant production management system is a supply organization system based on the synchronization of the processes of delivery of material resources of the required quantity and at the time when the operational system needs them, in order to minimize costs associated with stockpiling.

The need for production is created by the current demand for these products. When a product is sold, the market, according to this concept, "pulls" it from the last stage of production, i.e. the final assembly. This serves as a signal to start the production assembly line, where each worker immediately "pulls" the next part from the previous section of the material flow to replace the removed part. The section from which the part is taken, in turn, "pulls out" the now necessary part from the previous section and so on, until the "extraction" of raw materials. To ensure the continuity of such an "extraction" process, JIT requires high quality products at every stage of the process, clear fulfillment by suppliers of their contractual obligations and correct forecasting of demand for finished products.

JIT systems are sometimes informally divided into "big JIT" and "small JIT". "Big JIT" (often called unsaturated or underloaded production) is a concept of operational management, the task of which is to eliminate losses in all areas

3. Stock management systems and its main types

Stock management is a specific activity that involves the creation and storage of inventories. Stock management is a functional activity that aims to minimize the total amount of annual inventory costs provided proving that the customer service is satisfactory.

Stock System is a set of rules and methods of regulation, which can be used to control inventory levels and determine which of the levels should be maintained, which inventory should be changed and what should be the volume of the order.

The main purpose of the analysis of stocks in the field of production and warehousing services is to show when it is necessary to order certain components and what should be the size of the order.

Many companies tend to enter into long-term relationships with suppliers, which must meet their needs, for example, throughout the year. In this case, the questions "when" and "what should be the size of the order" become the question "when" and "how much to deliver".

The stock management system should determine the time and volume of purchases of products to replenish stocks.

The parameters of the stock management system are:

- order point (the minimum (control) level of stocks of products, subject to which it is necessary to replenish them);
- normative level of stocks (the estimated value of stocks, which is achieved during the next purchase);
- volume of separate purchase;

- frequency of procurement (the duration of the interval between two possible purchases of products, i.e. the frequency of replenishment of stocks of products);
- replenished quantity of products for which the minimum cost of stock storage is achieved in accordance with the specified replenishment costs and specified alternative costs of invested capital.

The following technological stock management systems are used:

- stock management system with a fixed order size;
- stock management system with a fixed frequency of orders;
- system with the established frequency of replenishment of stocks to the established level;
- system "Maximum-minimum".

For a situation where there are no deviations from the planned indicators and stocks are consumed evenly, in the theory of inventory management two main inventory management systems are developed: inventory management system with a fixed order size and inventory management system with a fixed order frequency. Other inventory management systems (a system with a set frequency of replenishment to a set level and a system of "maximum-minimum"), in fact, are a modification of these two systems.

The system with a fixed order size is quite simple and a kind of classic. In this system, the size of the order to replenish the stock is a constant value. The order for the supply of products is carried out

under the condition of reducing the stock available in the warehouses of the system to the established minimum critical level, which is called the "order point".

In the process of functioning of this technological system, delivery intervals can be different depending on the intensity of costs (consumption) of material resources in the system. The regulating parameters of this system are the order size and the "order point".

If the stock reaches the lower critical limit and organizes the next order for the supply of the necessary material resources, the stock level at the time of the order should be sufficient for uninterrupted operation during the operational cycle. The insurance reserve must remain intact. In some cases, a floating (oscillating) order point is used. It is not fixed in advance, and the time of ordering is determined taking into account the fulfillment of its obligations by the supplier or taking into account fluctuations in demand for manufactured products.

The minimum amount of stock in this system depends on the intensity of costs (consumption) of material resources in the period between the submission of the order and the receipt of the party to the warehouse in the system. It is conventionally assumed that this time interval in the procurement period is constant.

This control system provides protection of the enterprise from the formation of a deficit. In practice, the inventory management system with a fixed order size is used mainly in the following cases:

- large losses due to lack of stock;

- high storage costs;
- high cost of the ordered goods;
- high degree of demand uncertainty;
- availability of a discount from the price depending on the quantity ordered;
- imposition by the supplier of a restriction on the minimum size of the delivery lot.

A significant disadvantage of this system is that it provides for continuous accounting of the balance of material resources in the warehouses of the logistics system, so as not to miss the moment of reaching the "order point". In the presence of a wide range of materials (or range - for a commercial enterprise), a necessary condition for the use of this system is the use of automated identification technology.

II. COURSE WORK PREPARATION

INTRODUCTION TO THE COURSE WORK PREPARATION

An integral part of training specialists for the national economy of Ukraine is their mastering of a certain amount of economic knowledge on the problems of functioning and development of economic systems of various types. Among the disciplines that ensure the implementation of the latter is "Operational Management". An important form of independent work of students and a way to involve them in research work is the preparation and defense of term papers.

The implementation of the course work contributes to a deeper understanding of students of the discipline "Operational Management", the formation of their skills and abilities to independently analyze socio-economic processes, formulate and argue the proposed provisions, make informed conclusions and recommendations.

The course work is an independent, performed under the guidance of a teacher research on one of the relevant issues of management. Execution of course work is one of the types of educational and research work of students, designed to certify the level of knowledge acquired by students and the ability to use them in the development of theoretical and specific practical issues in the field of management.

Execution of the course work *aims to* consolidate and deepen the knowledge acquired by students in the process of studying the disciplines of management and administration; to develop students' skills of independent work with special literature, reference books, manuals, sources of statistical information, etc.; to teach students to generalize theoretical materials, to interpret the collected data, to independently formulate conclusions, to substantiate and defend their own point of view on the researched problems.

When performing course work on operational management, students are given the following *tasks*:

- to study the literature, regulations, reference, scientific, statistical sources on the selected topic;

- to provide independent analysis of the main concepts, provisions on the research topic, put forward by domestic and foreign scientists;

- to prepare a clear, consistent presentation of their views in the analysis of economic and management problems, the ability to apply the knowledge gained in the classroom, to connect them with practice;

- to obtain the consolidation and deepening of students' knowledge of management.

Thus, the implementation of the course work gives students the opportunity to expand and deepen their knowledge, gain the necessary experience of independent theoretical research.

PURPOSE AND TASKS OF IMPLEMENTATION OF THE COURSE PROJECT IN THE DISCIPLINE "OPERATIONAL MANAGEMENT"

Course project in the discipline "Operational Management" is independent work of a student majoring in 073 "Management", 075 “Marketing” in accordance with the curriculum. This project is a summary of the study of the discipline and in-depth study of one of the pressing problems of operational management of agricultural enterprises.

The *purpose* of the course project is to consolidate theoretical knowledge of operational management, acquired skills and abilities for self-study of literature sources, statistical materials, research of the peculiarities of the emergence and development of the crisis in enterprises, the experience of overcoming it.

The main *tasks* of writing and defending a course project are:

- to study the theoretical and methodological principles on the chosen research topic;

- to study of the impact of exogenous and endogenous factors on the emergence and development of the operational management at the enterprise;

- to conduct a comprehensive diagnosis of operational strategy of enterprises;

- to develop proposals to improve the operational system of the enterprise;

- to prepare a presentation as a personification of the main content of the course project and the author's proposals for further public defense.

TOPICS OF COURSE PROJECTS IN THE DISCIPLINE "OPERATIONAL MANAGEMENT"

The topics of course projects in the discipline "Operational Management" are developed and reviewed annually in accordance with the new trends in the operational management.

A student has the right to independently choose the topic of work. At the request of the student and in accordance with the operational management phenomena that are characteristic of the enterprise-base of writing a course project, the topic can be adjusted or clarified.

The choice of the topic should be formed taking into account its relevance for the enterprise, on the basis of which the project is planned, the possibility of obtaining reliable information on the current state and the formation of proposals for operational management.

ORGANIZATION OF THE COURSE PROJECT WRITING PROCESS

1. The sequence of project implementation

The project implementation process involves the following stages:

- choice of the topic of the course project, coordination with the head;

- selection of theoretical material and statistical data on selected topics;

- registration of the task for the course project;

- coordination of the project implementation schedule with the manager of the enterprise where the course work can be implemented;

- acquaintance with requirements concerning registration of the project;

- review of literary sources on selected topics;

- writing the work in accordance with current standards, requirements of methodological recommendations and in accordance with the implementation plan;

- registration of work and its handing in to the department;

- receiving feedback from the head;

- preparation of the presentation and defense of the course project.

2. Choosing a course project topic

From the list of topics proposed by the department the student chooses the most relevant, given the company on the basis of which the project is planned.

The student has the right to offer his/her topic, but in case if it corresponds to the discipline "Operational Management" and specialty 073 "Management", 075 “Marketing”.

3. Responsibilities of the course project manager

The course project manager is obliged to:

- agree with the student on his chosen topic;
- to help the student in writing the content of the course project;
- develop together with the student and approve the work schedule;
- provide recommendations on literature sources, reference materials, necessary statistical information, enterprise reporting, etc.;
- systematically advise the student and check the implementation of the structural components of the project;
- to carry out the general check of the course project;
- write a review of the head of the course project;
- prepare the student for defense;
- organize and defend the course project.

4. Information base for the course project

The selection of literature for the work should begin with the sources recommended by the lecturer in the study of the discipline and proposed in the guidelines.

The student will be able to use laws and regulations, reports, statistical materials of industry associations, research enterprises, textbooks and manuals, monographs, scientific publications in periodicals.

CONTENT OF THE COURSE PROJECT

The course project, regardless of the chosen topic, must contain:

- title page;
- content;
- introduction;
- the main part (three sections);
- conclusions and suggestions;
- list of used sources;
- applications.

REQUIREMENTS FOR THE DESIGN OF A COURSE PROJECT

1. General requirements

The course project is executed in one copy. The text is printed on one side of white A4 paper. Times New Roman font for Word text editor, size 14, normal, 1.5 spacing.

The volume of the project is within 40 pages of printed text taking into account the list of literature sources and Appendices.

Dimensions of the margins of the pages: top and bottom - 20 mm, right - 10 mm, left - 30 mm.

The paragraph indentation should be the same - 1.25-1.5 cm.

The language of writing the course project is English, style scientific, clear without spelling and syntactic errors. The work must be built logically, performed spelling, syntactically and punctuation competently.

The text of the main part of the project is divided into sections and subsections.

The introduction, each section, conclusions and list of references begin on a new page. Subdivisions are printed sequentially. Sections and subsections are numbered in Arabic numerals and printed in paragraph indents. The section number includes the section number and its serial number, separated by a dot (1.2, 2.4 ...).

The headings of the main parts "TABLE OF CONTENTS", "INTRODUCTION", "SECTION ...", "CONCLUSIONS", "RECOMMENDED LITERATURE", "APPENDICES" are printed in large bold letters and placed in the middle of the text, the headings of and placed with a paragraph indent. No full stop is added at the end of section and subsection names.

2. Tables

Tables are a convenient and informative form of submitting digital material.

The tables are placed after the first mention in the text or on the next page. The name is printed in small bold (except for the first capital) letters and placed above the table symmetrically to the text, and above the name in the right corner write the word table with the number (written in italics).

Example of table design (Table 3.5.)

Table 3.5

The impact of the proposed measures on key performance indicators of the enterprise

N	Indices	Measures	Basic year	Project year	Deviation

Sourse: created by the author on the basis of [5].

In that case, if the table summarizes the statistics or views of scientists on a particular problem, the link indicates the literature source and page: [7, p. 12].

Column numbering is performed when the table needs to be moved to the next page. If the continuation of the table is transferred to the next page, the name is not transferred, and in the right corner print the words "Continuation of the table ...” and put its number, the first row in the extended table are the column numbers. The units of measurement must be indicated in the table. If all units are the same,

they are placed in the table header after the name and written through a comma. Example,

Continuation of the table 3.5

N	Indices	Measures	Basic year	Project year	Deviation

Sourse: created by the author on the basis of [5].

3. Illustrations

Illustrations (figures, diagrams, charts, graphs, etc.) are placed immediately after the text where they are mentioned, or on the next page. The word "Fig.", Its number and name are given after the illustration. A full stop is not placed after the image title. All illustrations must be referenced in the text. If the illustration does not fit on one sheet, you can place it at the beginning of the next page. Figures are numbered sequentially within the section. The figure number includes the section number and its personal number through a period. Example

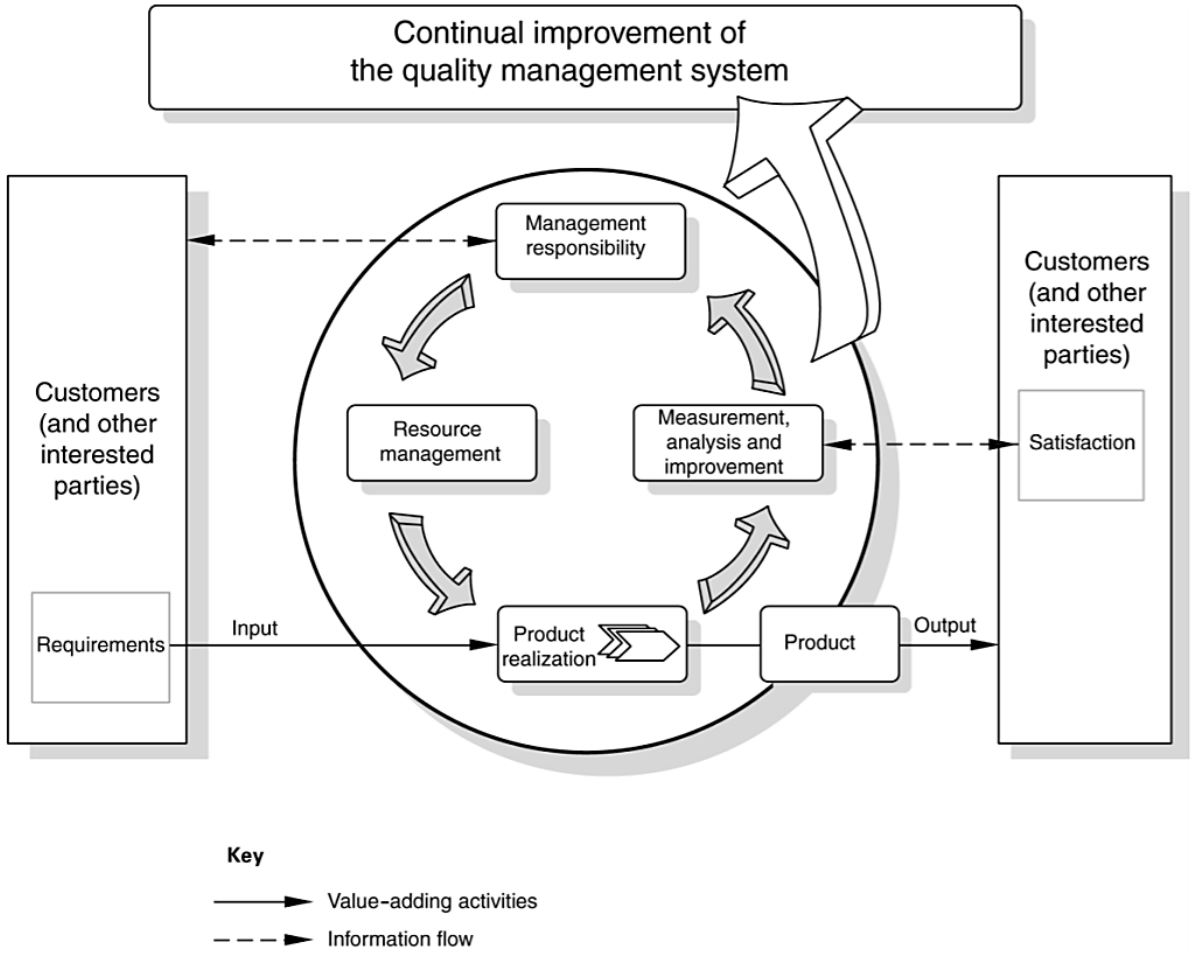


Fig. 4. Process model of dairy production QMS

Sourse: created by the author on the basis of [8].

4. Formulas

Formulas are printed immediately after the text where they are mentioned, in the middle of the line. Above and below at least one free line is left. Formulas are numbered in Arabic numerals, the number consists of a section number and the ordinal number of the formula, separated by a period. The number is placed in parentheses,

on the right at the level of the formula. Explanations of the symbols included in the formula, if they are not explained in the text, are given directly below the formula, in the sequence in which they are given in the formula. An explanation of the meaning of each character is given on a new line. The first line begins without a paragraph with the word "where" without a colon. The formulas given one after another are separated by a comma. Formulas are printed in the Microsoft Equation editor.3.

Example:

$$f_x = a \cdot b^e$$

(2.1)

where f_x is a function of …….

5. References

When writing a course project, the student must provide references to literary sources, the materials of which are given in the work. References are provided immediately after the end of the citation or author's definition in square brackets, indicating the serial number of the source in the bibliography and the corresponding page of the source. For example: [7, p. 25].

EXAMPLES OF BIBLIOGRAPHICAL DESCRIPTIONS FOR THE LIST OF LITERATURE LINKS (according to the DSTU 8302: 2015 "Information and documentation. Bibliographic link. General provisions and rules of compilation")

Source characteristics	**Example of formalizing**
DOCUMENTS	
One author	Chepinoga V.G. Fundamentals of economic theory: textbook. Kyiv: Lira-K, 2017. 240 p. Konnov O.F. Historical dynamics of the artistic style: monograph. Kyiv: Publishing House of the National Pedagogical University named after M.P. Drahomanov. 2015. 187 p
Two authors	Zabrotsky M.M., Shaposhnikova Y. G. Pedagogical psychology. Lectures: textbook. Kherson, 2017. 144 p.
Three authors	Kryvovyazyuk I.V., Smerichevsky S.F., Kulyk Y. M. Risk management of the logistics system of machine-building enterprises: monograph. Kyiv: Condor, 2018. 200 p.
Four authors and more	The world of plants in the work of I.P. Kotlyarevsky: popular science essays / M.V. Grinyova and others. Poltava, 2017. 112 p.
Multi-volume edition	Encyclopedia of the History of Ukraine: in 10 volumes / editor. : V.A. Smoliy and others. Kyiv, 2003–2013. T. 1–10. Legal system of Ukraine: history, state and prospects: in 5 volumes / Acad. Of Law Sciences of Ukraine. Kharkiv: Pravo, 2009. Vol. 2: Constitutional principles of the legal system of Ukraine and problems of its improvement / general. ed. Yu. P. Bityak. 576 s.
A separate volume of a multi-volume edition	Ushinsky K.D. Man as a subject of education. An attempt at pedagogical anthropology: selected. writings. T. 1. Kyiv: Soviet school, 1983. 480 p. Chemical encyclopedia: in 5 vols. Vol. 2. Moscow: Soviet encyclopedia, 1990. 671 p.

Collective author	Management in the XXI century: methodology and practice: a collective monograph / Poltava National Technical University. Y. Kondratyuk. Poltava: Simon, 2015. 347 p.
Editor, compiler	International economic relations: textbook / edited by: S.O. Yakubovsky, Y.O. Nikolaev. Odessa: ONU, 2015. 306 p. Dakhno II, Alieva-Baranovska V.M. Intellectual property law: textbook. way. / by ed. I.I. Dakhno. Kyiv: CUL, 2015. 560 p. Print of Ukraine. 2016: stat. yearbook. / compl. S.V. Buryak. - Kyiv: Book Chamber of Ukraine, 2017. 100 p.
Abstracts, conference proceedings	Library local lore in the cultural space of Ukraine: collection of materials of All-Ukrainian scientific-practical conf., Kyiv, November 2. 2017. Kyiv: National Academy of Management of Culture and Arts, 2017. 246 p. Synanthropization of vegetation of Ukraine: theses of sciences. All-Ukrainian Science. conf., Pereyaslav-Khmelnytsky, April 27-28. 2006. Pereyaslav-Khmelnytsky, 2006. 240 p.
Collection	Ukraine - the constellation of cultures: a collection. Kyiv: Novy Druk, 2018. 244 p. Science of Ukraine in the world information space: a collection. Kyiv: Academic Periodicals. 2018. Ed. 15. 104 p.
Translation from another language	Garford, Tim. Things that changed the world. History of economics in 50 inventions: transl. from English Kyiv, 2018. 352 p.
Standards	DSTU 3582: 2013. Bibliographic description. Abbreviations of words and phrases in Ukrainian. General requirements and rules (ISO 4: 1984, NEQ; ISO 832: 1994, NEQ). [To replace DSTU3582-97; valid from 2013-08-22]. Offic. Kyiv: Ministry of Economic Development of Ukraine, 2014. 15 p. (Information and documentation). DSTU EN 61010-2-020: 2005. Safety requirements for electrical equipment for measurement, control and laboratory use. Part 2-020. Additional requirements for laboratory centrifuges (EN 61010-2-020: 1994, IDT). Kyiv: Derzhspozhyvstandart of Ukraine, 2007. IV, 18 p.

Patents	A method of treating attention deficit hyperactivity disorder in children: US Pat. 76509 Ukraine. № 2004042416; declared 01.04.2004; publ. 01.08.2006, Bull. № 8 (book 1). 120 p. Two-chamber jet-irrigation sulfitator: US Pat. 112332 Ukraine. № 201606608; declared 16.06.2016, Bull. № 23. 4 p.
Archival documents	Activities of the historical section at the Ukrainian Academy of Sciences and related historical institutions of the Academy in 1929–1930 // Institute of Manuscripts of the V.I. Vernadsky National Library of Ukraine. F. X (All-Ukrainian Academy of Sciences). Ref. 1686. 30 p. Materials of the Council of People's Commissars of the Ukrainian People's Republic. Central State Archives of Ukraine (Central State Archive of Higher Authorities and Administration of Ukraine). F. 1061. Op. 1. Ref. 8–12. Copy; F. 1063. Op. 3. Ref. 1–3.
Dissertations, dissertation abstracts	Vinichenko O.M. System of dynamic control of social and economic development of the industrial enterprise: dis. ... Dr. Econ. Science: 08.00.04. Dnipro, 2017. 424 p. Ustyan O. Y. Client-oriented marketing of enterprises in the field of entertainment and recreation: author's ref. dis. ... cand. econ. Science: 08.00.04. Poltava, 2018. 20 p.
Preprints	Panasyuk M.I., Skorbun A.D., Sploshnoy B.M. On the accuracy of determining the activity of solid radioactive waste by gamma methods. Chernobyl: Institute for AES Safety Problems of the National Academy of Sciences of Ukraine, 2006. 7, [1] p. (Preprint. NAS of Ukraine, Institute of AES Safety Problems; 06-1).
PART OF DOCUMENTS	
Part of the book	Franko I. Stolen happiness // I. Franko. Writings. Kyiv, 1966. P. 322–419. Alekseiev V.M. Legal status of a person and its implementation in the relationship between the state and society in public administration in Ukraine. Theoretical principles of the relationship between the state and society in management: a monograph. Chernivtsi, 2012. P. 151–16

Abstracts, conference proceedings	Maistrenko V.M., Osadchuk O.P. Theoretical bases of quality management system implementation. Problems of management and economics of enterprises in modern conditions: materials of the XV International scientific-practical conf., Kyiv, April 23-24. 2019. Kyiv: NUHT, 2019. P. 18-21. Antsiperova I.I. Historical and legal aspects of the budget. Research of problems of law in Ukraine through the eyes of young scientists: thesis. All-Ukrainian scientific-practical conf., Zaporozhye, April 24. 2014. Zaporizhia, 2014. P. 134–137.
Legislative and regulatory documents	On plant protection: Law of Ukraine of October 14. 1998 № 180-XIV. Information of the Verkhovna Rada of Ukraine. 1998. № 50/51. P. 914-924. Instruction on the procedure for accrual and payment of a single contribution to the obligatory state social insurance: approved by order of the Ministry of Finance of Ukraine dated April 20. 2015 № 449. All about accounting. 2015. № 51. P. 21–42. About the statement of Requirements to registration of the dissertation: the order of the Ministry of Education and Science from January 12. 2017 № 40. Official Gazette of Ukraine. 2017. № 20. P. 136–141. Instruction on the procedure for accrual and payment of a single contribution to the obligatory state social insurance: approved by order of the Ministry of Finance of Ukraine dated April 20. 2015 № 449. All about accounting. 2015. № 51. P. 21–42.
Articles from periodicals	Murashko I.S. Bionomic approach to sustainable development of the enterprise. Bulletin of Zaporizhia National University. Economic Sciences Series. 2017. № 4. P. 43–49. Blyzniuk O.P., Staverska T.O., Ivanyuta O.M. Formation of credit and monetary mechanism for sustainable development of trade enterprises of Ukraine. Business Inform. 2019. № 7. P. 240–249.
ELECTRONIC SOURCES	
Books	Academic honesty as a basis for sustainable development of the university / by general. ed. T.V. Finikov, A.E. Artyukhov. Kyiv: Tucson, 2016. 234 p. URL: http://www.univer.kharkov.ua/images/redactor/news/2016-09-07/chesnist_osnova_rozvitk_Univers.pdf (access date: 02.11.2017).

Articles from periodicals	Kostyuchenko Y. M. Dispute Resolution Mechanisms in the Association Agreement between Ukraine and the EU. Scientific Bulletin of Uzhhorod National University. Series: Right. 2019. Vip. 56, v. 2. pp. 144-147. URL: http://www.visnyk-juris.uzhnu.uz.ua/file/No.56/part_2/31.pdf (access date: 23.08.2019). Miroshnychenko O. Y., Karyuk V.I. Stages of formation of organizational and economic mechanism of innovative activity of enterprises. Efficient economy. 2012. № 2. URL: http://www.economy.nayka.com.ua/?op=1&z=932 (access date: 22.01.2018).
Legislative documents	On standardization: Law of Ukraine of February 11. 2014 № 1315. URL: https://zakon.rada.gov.ua/laws/show/1315-18 (access date: 02.09.2019). About the statement of the Order of use of documents through exchange library funds: the order of the Ministry of Culture of Ukraine from October 31. 2017 № 1131. URL: https://zakon3.rada.gov.ua/laws/show/z1583-17 (access date: 02.08.2019).
Website pages	Organic farming and its development in Ukraine // Agronews: web-site. URL: https://agronews.ua/node/24264 (access date: 02.09.2019). Beautiful and amazing Poltava. My planet: website. URL: http://myplanet.com.ua/?p=10440 (access date: 10.09.2019). Chaika AS Inclusive education - a way to full socialization of students with special educational needs. Education: website. URL: https://vseosvita.ua/library/inkluzivna-osvita-slah-do-povnocinnoi-socializacii-ucniv-z-oop-1906.html (access date: 12.08.2019).

6. List of used literature sources

Sources can be placed:

- in the order of appearance of links in the text;

- in alphabetical order of authors' surnames or titles (four or more authors).

Information on the sources used must be provided in accordance with the requirements.

7. Appendices

Appendices are placed after the conclusions in the order of references to them in the text of the work. Appendices are denoted by capital letters of the English alphabet starting with A.

Each appendix starts on a new page with the Appendix A in the upper right corner of the page.

The application must have a title that is printed symmetrically to the capitalized text.

8. Page numbering

All pages of the work, except for appendices, are numbered starting from the title page. The first page of the work is the title, but the number is not affixed to it, then the pages are numbered sequentially with the number.

The serial number of pages is placed on the right edge at the top of the field.

PROCEDURE FOR PROTECTION OF COURSE PROJECT, EVALUATION CRITERIA

Student defense of the course project is public.

Students who have completed a course project in accordance with the above requirements and in accordance with the writing schedule are allowed to defend.

The defense procedure involves a brief presentation of the students ' research results and suggestions for solving problems, answers to questions from the supervisor and those present.

In case of unsatisfactory defense, the decision on re-defense of the course project by the student, provided the possibility of completion, is made by the head, if necessary, to develop a new topic at a meeting of the department.

The general assessment of the level of knowledge, skills and abilities of students in the discipline on the ECTS scale and the national scale is set basing on the number of points obtained by the results of the module control and scores obtained in the test, according to the table.

The supervisor evaluates the implementation of the course project according to the following criteria:

- project writing;
- report;
- answers to questions.

Table 1.

Rating: national and the ECTS

Sum of points	**National grade**
	Course project
90 – 100	excellent
82-89	good

74-81	
64-73	satisfactory
60-63	
35-59	Unsatisfactory with the possibility to pass
0-34	Unsatisfactory without the possibility to pass

The general final assessment of the course project is derived on the basis of the following components:

90-100 points - "excellent";

75-89 points - "good";

60-74 points - "satisfactory";

59 points or less - "unsatisfactory".

Table 2.

Criteria for evaluating the success of the course project

Number of points	**Mark**	**Evaluation criteria**
Evaluation of course project writing		
54-60	excellent	The content of the work fully corresponds to the task, the relevance of the work is proven, the tasks are solved completely, the goal is achieved, the

		proposals are specific and justified by calculations, the work is written competently and on time, designed in accordance with the requirements
45-53	good	The content of the work fully corresponds to the task, the relevance of the work is proved, the tasks are solved completely, the goal is achieved, the proposals are specific and justified by calculations, the work is written with some errors or non-compliance with the schedule, there are comments
36-44	satisfactory	The content of the work mainly corresponds to the task, the relevance of the work is proved, the tasks are not completely solved, the proposals are insufficiently substantiated, the work is written with errors or non-compliance with the schedule, there are comments on the design
1-35	unsatisfactory	The content of the work does not correspond to the task, gross mistakes were made

Evaluation of the report on defense		
18-20	excellent	The report is logically constructed, thesis with a statement of the results, argumentation of proposals, conclusions
15-17	good	The report contains minor errors
12-14	satisfactory	The report contains errors that do not fully reflect the results of the work
1-11	unsatisfactory	The report does not contain the main idea
Evaluation the answer to the question		
18-20	excellent	At least 60% of the answers are rated "excellent", 30% - "good", 10% - "satisfactory".
15-17	good	At least 50% of the answers are rated "excellent" and "good", the rest - "satisfactory".
12-14	satisfactory	At least 60% of the answers were positive
1-11	unsatisfactory	More than 40% of responses were rated "unsatisfactory"

Topics of course projects in the discipline "Operational Management"

1. Formation of target management of the enterprise

2. Theoretical principles of increasing the competitiveness of the enterprise in domestic and foreign markets

3. Methodological bases of personnel management of the enterprise

4. Creating a favorable socio-psychological climate in the enterprise

5. Fundamentals of information management in modern enterprises

6. Theoretical foundations of the enterprise management system

7. Theoretical and methodological foundations of enterprise cost management

8. Methodological bases of information management at the enterprise

9. Theoretical and methodological foundations of human resource management of the enterprise

10. Theoretical and methodological aspects of labor productivity

11. Fundamentals of communication interaction of structural units of the enterprise

12. Theoretical foundations of innovation management

13. The use of information technology in enterprise management

14. Theoretical aspects of information and analytical resources of the Internet in enterprise management

15. Basics of the process of motivation of staff work

16. Methodological bases of personnel turnover management at the enterprise

17. Theoretical principles of forming an effective personnel management system at the enterprise

18. Formation of the motivational mechanism at the enterprise

19. Investment policy of the enterprise in market conditions

20. Fundamentals of modeling inventory management of the enterprise

21. Basics of determining the effectiveness of the enterprise

22. Theoretical aspects of substantiation of measures to reduce production costs

23. Theoretical foundations of the production program on the basis of marketing research

24. Logistics as a basis for sales process management in the enterprise

25. Theoretical foundations of quality management in the enterprise

26. Theoretical and methodological foundations of situational management

27. The image of the modern leader as an element of the management system of the organization

28. Theoretical and methodological aspects of studying of personnel structure at the enterprise

III. TESTS

1. Formation of an effective management system of operations in production is:

A) the purpose of operational management;

B) the subject of operational management

C) the main task of operational management;

D) the object of operational management

ANSWER: A

2. Operations in various spheres of human activity are:

A) the purpose of operational management;

B) the subject of operational management;

C) the main task of operational management;

D) the object of operational management

ANSWER: D

3. Construction of management systems that ensure the implementation of the necessary actions and procedures to obtain a market result from the operation of any operational system is:

A) the subject of operational management;

B) the object of operational management;

C) the main task of operational management

D) the focus of operational management

ANSWER: C

4. Efficiency and rationality in the management of any operation are:

A) the subject of operational management;

B) the object of operational management

C) the main task of operational management

D) the focus of operational management

ANSWER: D

5. Regularities of planning, creation and effective use of the operational system of the organization are:

A) the subject of operational management;

B) the object of operational management;

C) the main task of operational management;

D) the focus of operational management

ANSWER: A

6. Which of the following definitions does not reflect the essence of "operational management"?

A) it is an activity related to the management of the process of converting input values into output results

B) it is management of all activities related to the deliberate transformation (transformation) of materials, information or customers;

C) this activity is associated with continuous planning and control of the operational process, the result of which is the products of the company (firms, organizations, institutions, enterprises, etc.);

D) it is an activity related to the development, use and improvement of production systems on the basis of which the main

products or services of the company (firms, organizations, institutions, enterprises, etc.) can be produced.

ANSWER: C

7. Which of the concepts is broader in the context of operational management - "production" or "operation" and why?

A) the term "operation" is an integral part of production management and therefore it is narrower than the term "production"

B) the term "operation" is much broader than the term "production" because the term "operation" includes not only the production of goods but also the provision of services

C) the term "operation" is used only in the field of services and is therefore a narrower concept;

D) the term "production" is broader than the term "operations" because it is used when referring to production processes

ANSWER: B

8. In operational management the following operations are distinguished as activities:

A) production, supply, supply, service

B) service, production, sales, promotion;

C) production, supply, transportation, service;

D) production, promotion, transportation, service.

ANSWER: C

9. The set of actions (rules) to solve the problem is:

A) methods of operational management;

B) the essence of the concept of "algorithm";

C) the direction of operational management;

D) the process of operations management

10. ANSWER: B

"Operational management" is:

A) all activities related to the intentional transformation (transformation) of materials, information or customers;

B) organizational formation, functioning in the market in the system of productive forces and production relations, in which there is a direct union of labor with the means of production;

C) all types of activities related to the purposeful impact on objects, systems in order to maintain their sustainability or transfer from one state to another in order to achieve certain goals;

D) planning, organization, control of all activities related to movement, warehousing, which ensure the passage of material flows

ANSWER: A

11. The main types of operational priorities include:

A) marketable products of all divisions of the enterprise;

B) resources used in the process of maintenance and production management

C) fixed assets of the enterprise

D) production costs, quality and reliability of products, order fulfillment time, etc.

ANSWER: D

12. Operational strategy planning is to develop

A) strategies

B) goals

C) mission

ANSWER: A

13. The service strategy begins with the

A) analysis of the actually achieved results of work

B) determining the priorities that are achieved and on the basis of which the firm will compete in the market

C) analysis of current work results

D) comparison of the implementation of the planned works with the actual results

ANSWER: B

14. When a firm does something better than its competitors, i.e. remains competitive, which allows it to attract and retain consumers - it is:

A) market entry

B) market capture

C) expressed competence

D) substantive competence

ANSWER: C

15. The essence of the strategies that determine the dynamics of equipment and production technologies and the impact of market

factors on them, as well as strategies that form the technological profile of the enterprise belong to the industry

A) strategic decisions

B) structural decisions

C) tactical decisions

D) technological solutions

ANSWER: D

16. Strategic components of operational management are:

A) product design, structure and content of the process, choice of location, human resources, supply

B) stocks, quality management, technology, reliability and repair of equipment

C) production capacity, vertical integration, technological processes, scale of production

D) production infrastructure, production management, use of production personnel

ANSWER: A

17. Operational capabilities are:

A) a portfolio of opportunities that are necessary to adapt to the changing demands of the firm's customers for its products and services;

B) opportunities and ways to obtain information for decision-making

C) components of the overall planning process that ensure compliance of operational tasks with the objectives of a broader organizational structure

D) a portfolio of opportunities necessary for the operational activities of the enterprise

ANSWER: A

18. The strategy which is to develop a general policy and plans for the use of the firm's resources aimed at the most effective support of its long-term competitive strategy is:

A) operational strategy

B) financial strategy

C) corporate strategy

D) market strategy

ANSWER: A

19. Which of the following strategies is based on the company's mission and involves the use and development of all production facilities of the organization, in order to achieve a strategic competitive advantage?

A) operational

B) financial

C) corporate

D) market

ANSWER: C

20. The set of strategies that determine the integration interactions of production units in order to effectively influence the consumer products, suppliers, competitors belong to the industry:

A) strategic decisions

B) structural decisions

C) tactical decisions

D) technological solutions

ANSWER: B

21. What are the main features of an open system?

A) interaction with the internal environment

B) interaction with structural units of the entire system

C) interaction with producers of goods

D) interaction with the external environment

ANSWER: D

22. The type of production, which involves the manufacture of a single product in large quantities over a long period of time is called

A) project

B) individual

C) mass

D) serial

ANSWER: C

23. What type of production has the following meaningful characteristics: "it is unique, each unit of final product is unique in design, tasks performed, placement, etc."?

A) project

B) individual

C) serial

D) mass

ANSWER: A

24. The planning and control subsystem is an area that:

A) is directly related to the conversion of input values into output results

B) receives information on the state of the processing subsystem and the support subsystem, processes this information and issues a decision on how the processing subsystem should work

C) is not directly related to the conversion of input values into output results

D) is created on the basis of rational (vertical and horizontal) division of labor

ANSWER: B

25. By type of environment, operational systems are divided into

A) rigid and flexible

B) radial, radial-nodal and tree-like

C) industrial, technical, transport, educational, etc.

D) simple, complex and super-complex

ANSWER: C

26. The situational approach to production means:

A) management techniques to solve certain tasks

B) selection of management techniques for solving specific management situations

C) selection of management techniques for solving specific management situations in order to achieve certain goals of the organization

D) specific techniques with specific situations, in order to most effectively ensure the achievement of the goals of the production system

ANSWER: D

21. What is the essence of the concept of "operational system"?

A) it is an open system that converts input values (resources) into output (products, services)

B) it is the central link of any organization, created on the basis of rational division of labor and combination in time and space of production resources, through which the operational function is realized

C) it is a control system that includes a control subsystem (control subject) and a controlled subsystem (control object)

D) it is an open system, the main task of which is to process the incoming resources into the final product

ANSWER: B

22. An operational function is an action that results in:

A) manufactured goods and services rendered

B) determining the prospects for the development of the system

C) implementation of plans and programs through cooperation of labor and tools

D) detection of impending threats, errors, deviations from established norms, norms and standards.

ANSWER: A

23. The function of the system characterizes:

A) the manifestation of the properties of systems in this set of relations and is a mode of action in interaction with the external environment

B) the external environment of the enterprise, factors of direct influence

C) the choice of actions, means and resources to ensure the achievement of goals;

D) rhythmic production and economic activity

ANSWER: A

24. What is the essence of a systematic approach to operational management?

A) the set of interacting parts in the organization

B) the aggregate of the subject and the object of management

C) a set of interconnected elements (parts)

D) the set of interconnected parts, each of which contributes to the characteristics of the whole

ANSWER: D

25. The internal ability of the system to provide the necessary technological processing of resources is called

A) nominal capacity

B) operational capacity

C) input capacity

D) output capacity

ANSWER: B

26. Support of vital activity, preservation of the functions defining integrity of operating system, its qualitative certainty and characteristics of its essence are

A) survival

B) existence

C) functioning

D) development

ANSWER: C

27. The type of organization of material flow with the use of one or more technological processes is

A) the structure of the operational process

B) the structure of the production flow;

C) continuous flow

D) serial production

ANSWER: B

28. By type operational processes are divided into:

A) processing and assembly processes

B) processing, testing and assembly processes

C) manufacturing, testing and assembly processes

D) processes of processing, manufacturing, testing and assembly

ANSWER: D

29. By placement in space, operational processes are divided into

A) group, stream and subject

B) discrete, aperiodic, periodic

C) radial, radial-nodal and tree-like;

D) basic, auxiliary and service

ANSWER: A

30. Operational processes by form of organization are divided into

A) rigid and multivariate

B) basic, auxiliary and service

C) sequential, parallel and sequentially parallel

D) deterministic, stochastic and mixed

ANSWER: C

31. The set of interconnected main, auxiliary and service processes, as a result of which resources are transformed into finished products (services) is

A) the process of planning the product (services)

B) operational process

C) technological process

D) production process

ANSWER: B

32. Which of the following lists of resources as inputs to operational activities is the most accurate and complete?

A) technical, technological, personnel, spatial, financial, information

B) labor, material, financial, technological, information

C) labor, financial, information

ANSWER: B

33. Controlled factors of production with cost properties and transformative capabilities, necessary to ensure the functioning and development of production processes in order to achieve the planned results are

A) staff

B) information

C) materials;

D) resources

ANSWER: D

34. According to the role of operational management processes are divided into

A) rigid and multivariate

B) linear, cyclic, branched and adaptive

C) symmetrical, asymmetrical, bypassing the rank (level)

D) basic, auxiliary and service

ANSWER: D

35. The evaluation of the operational strategy is

A) comparison of results of work with the purposes

B) comparison of costs with profits

C) comparison of the results of work with the mission and goals of the organization

D) comparison of the achieved results for a certain period

ANSWER: C

36. The strategy, which is to develop a general policy and plans for the use of the firm's resources, aimed at the most effective support of its long-term competitive strategy is:

A) operational strategy

B) financial strategy

C) corporate strategy

D) market strategy

ANSWER: A

37. Strategic components of operational management are

A) product design, structure and content of the process, choice of location, human resources, supply

B) stocks, quality management, technology, reliability and repair of equipment

C) production capacity, vertical integration, technological processes, scale of production

D) production infrastructure, production management, use of production personnel

ANSWER: A

38. Strategy is…:

A) the activities of the enterprise aimed at the emergence of new methods of forecasting the future

B) a detailed, comprehensive plan

C) the organization of market management and the external environment

D) diversification of products in order to conquer the market

ANSWER: B

39. Which of the following indicators of business positions is not included into the BCG matrix

A) star

B) sheep

C) dairy cow

D) dog

ANSWER: B

40. The mission of the organization means

A) the reason for the establishment of the organization

B) the main tasks of the organization

C) a clear reason for the existence of the organization

D) tactics of the organization

ANSWER: C

41. Operational strategy planning is to develop

A) strategies

B) goals

C) missions

D) tactics and policies

ANSWER: A

42. Production strategy, in which the variable that compensates for fluctuations in demand is working time with a variable number of employees is called:

A) tracking

B) a constant level of production

C) flexible use of working time

D) optimal costs

ANSWER: C

43. The production strategy, which provides for the coordination of the pace of production with the volume of orders or hiring (dismissal) of labor, depending on the change in the volume of orders is called the strategy

A) flexible use of working time

B) tracking

C) a constant level of production

D) optimal costs

ANSWER: B

44. Which of the following is the essence of aggregate planning?

A) transformation of annual and quarterly business plans into detailed production plans, which determine the volume of production and use of labor resources for the short term;

B) transformation of annual and quarterly business plans into detailed production plans, which determine the volume of production and use of labor resources for the long term

C) transformation of annual and quarterly business plans into detailed production plans, which determine the volume of production and use of labor resources for the medium term

D) transformation of annual and quarterly business plans into detailed production plans, which determine the volume of production and use of labor resources for the current period

ANSWER: C

45. The classifications of projects by class (composition and structure of the project and its subject area) do not include:

A) organizational projects

B) mono-project

C) multi-project;

D) megaproject

ANSWER: A

46. The purpose of the financial analysis of the project

A) assess the readiness of the enterprise to implement the project

B) calculate cash flow indicators

C) determine whether the project is cost-effective and efficient

D) determine the financial viability of the project to make decisions on the feasibility of its investment and financing

ANSWER: D

47. At what stage of the project life cycle is there the search for interested in the project participants being conducted?

A) well-grounding of the project

B) expertise

C) development of the project concept

D) project implementation

ANSWER: A

48. Project planning is

A) substantiation of the goals and means of their achievement on the basis of identification of resources, definition of a complex of works, effective methods and means necessary for their performance, and establishment of interaction of the organizations - participants of the project

B) the choice of actions, means and resources to ensure the achievement of the mission of organizations

C) the choice of targets and methods of achieving the mission of the organization

D) setting priorities and sequence of actions

ANSWER: A

49. Network schedule is

A) a set of graphical methods used in project planning and monitoring

B) processes and activities that require time and resources

C) the result of one or more work performed

D) construction of tables of works where their duration is specified

ANSWER: A

50. Project participants do not include

A) the customer

B) subcontractor

C) the investor

D) dealer

ANSWER: D

51. The internal environment of the project includes

A) the level of information technology

B) living conditions and standard of living

C) project management style

D) the level of taxation

ANSWER: C

52. Economic projects are

A) projects, the main purpose of which is the creation or renovation of fixed assets, which requires investment

B) projects in which the main goal is to develop and apply new technologies, know-how and other innovations that ensure the development of systems

C) projects, the goals of which are predetermined, related to the organizational improvement of the system

D) projects aimed at improving the functioning of the system

ANSWER: D

53. Mutually exclusive projects are

A) projects, the acceptance and rejection of which does not affect the profitability of other projects;

B) projects, the implementation of which is impractical when making decisions on the implementation of another project, as the profitability of the first is reduced to zero

C) projects, the benefits of which are due to the adoption of another project

D) projects that increase each other's profitability, and the increase in profitability of one project can be based on both reducing costs and increasing benefits

ANSWER: B

54. The project is:

A) a plan of long-term financial investments

B) action program for the use of financial resources

C) tasks with certain initial data and planned results that determine the method of its solution

D) a set of interrelated measures designed to achieve certain goals within a given time with established resource constraints

ANSWER: C

55. Labor productivity is:

A) the efficiency of labor costs, the ability of a particular work to create a unit of time a certain amount of material goods

B) the efficiency of labor costs, the ability of specific labor to create per unit time to reduce the material consumption of products

C) the efficiency of labor costs, the ability of specific labor to create low prices for raw materials per unit time

D) the efficiency of labor costs, the ability of a particular labor to create per unit time to reduce the price of finished products

ANSWER: A

56. The external factors of productivity growth do not include

A) policy and strategy

B) market infrastructure

C) personnel, organization of production and labor

D) natural resources

ANSWER: C

57. The internal factors of productivity growth do not include

A) the nature of the product

B) technology and equipment

C) legislation

D) motivation system

ANSWER: C

58. Factors affecting productivity

A) material

B) organizational and economic

C) social and geographical location of enterprises

D) all of the above

ANSWER: D

59. Ways to increase the technical level of production do not include

A) replacement of existing technical means with more advanced ones, equipment modernization

B) mechanization and automation of production

C) change in the share of certain types of products (services) and industries

D) the use of advanced technologies

ANSWER: C

60. The improvement of the management of the organization of production and labor does not include

A) improvement of structures and rational distribution of management functions

B) the introduction of rational distribution and organization of labor of workers

C) diversification of production and commissioning of new shops

D) improving the economic characteristics of labor

ANSWER: C

61. Productivity of the enterprise (organization) is

A) the balance between all factors of production (material, financial, human, informational, etc.), which provides the largest production at the lowest cost

B) the balance between all factors of production, which provides a reduction in the price of finished products

C) the balance between all factors of production, which provides training for workers

D) the balance between all factors of production, which provides an increase in output

ANSWER: A

62. The productivity cycle is

A) a logical sequence of actions that provides the company with low prices for raw materials

B) a logical sequence of actions that provides the company with the opportunity to succeed through increased productivity

C) a logical sequence of actions that ensures the introduction of new technologies

D) a logical sequence of actions that improves the quality of raw materials, components, tools or just components

ANSWER: B

63. The effectiveness of the operational system is

A) the degree of achievement of the system's goals, the degree of completion of the "necessary" work

B) the degree of use of the necessary resources by the system

C) the degree of compliance of the system with the requirements, certificates and expectations

D) the degree of improvement of labor organization and production

ANSWER: A

64. Improving operational activities is possible through

A) increase funding for research and development

B) evaluation and re-equipment of production facilities

C) achieving flexibility of the organization's workforce by training employees to perform several different jobs

D) all the above answers are correct

ANSWER: D

IV. PRACTICAL TASKS

TOPIC 1. Operational management as a kind of functional management

Practical lesson plan

I. Oral examination

1. The essence, scope and organization of production activities. Relationship between the organization's function and management.

2. The concept of operational management and evolution of its development.

3. Goals and objectives of operational management.

4. The process implementation of operational management.

5. Functions, methods and principles of operational management.

II. Execution of educational tasks

Educational tasks

1. The basis of the activities of any organization are operations in which products are created and delivered to consumers. These operations require a variety of input components, which are then converted into the desired combinations for customers (see Fig. 1). The input components include raw materials, components, performers, information, money and other resources. Operations include production, service, transportation, sales, staff training, etc. The main products - goods and services.

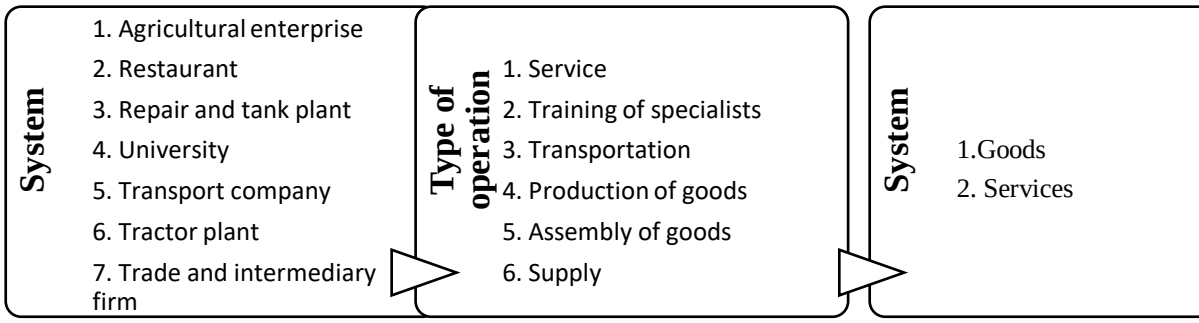
Fig. 1. A set of operations required to convert the input components into a finished product

Task to solve

The restaurant chain uses food, chefs, kitchen equipment, waiters and directly the area where customers eat as input ingredients.

It is necessary to make similar to the above-stated scheme (see fig. 1) with the instruction of the full list of concrete operations of restaurant on processing (transformation) of entrance components into ready food for clients. Indicate on the diagram the entrance of the "products" of the restaurant.

2. Select the appropriate type of operations and end product for each of the following production systems.



3.Describe the production processes of the following systems on the example of the system "Hospital".

Table 1. Components of production processes of different enterprises

System	**Resources**	**“Entrance”**	**Production function**	**“Exit”**
Hospital	Patients	Doctors, nurses, equipment	Medical aid	Healthy people
Canteen				
Supermarket				
Tank plant				

Bus station				

TOPIC 2. Operational strategy

Practical lesson plan

I. Oral examination

1. The concept of operational strategy of the enterprise

2. The composition of fixed resources as input factors of operational activities

3. Operational (production) process of the organization as a basis for the functioning and development of the operational strategy

4. Basic principles of formation a production strategy

5. Organizational and technical level of production.

II. Execution of educational tasks

Educational tasks

Although in Japan the practice of lifelong employment was the norm for some workers, the downturn in the economy meant that some corporations could no longer follow that system and avoid lifelong employment contracts while preventing dismissal. A new category of temporary workers stood out (that was implemented only in Japan).

Temporary workers have a limit on the number of one-year contracts. Employees such as car developers are not offered a lifetime employment scheme. The company will pay such employees depending on the contribution of each, abolishing the old payment

system, which depends on the service (the number of years worked in the company) and the performance of the company as a whole.

Following Toyota's formula (as the economic situation has changed radically) it has become clear that the old solid organizational structure now hinders the company's economic development, Toyota President T. Toyoda plans to gradually increase the number of contract employees at its plants in Japan.

Other organizations are following the example of Toyota. The number of white-collar workers working under contract will increase, but it is easier to limit it than the number of employees working under a lifelong employment system.

The number of contract workers both among blue-collar workers and among white-collar workers increased from 14% in 1999 to 19% in 2002. Such temporary workers can become a kind of "safety valve" in today's economic environment. According to the executive director of one of the leading Japanese companies, "it is worth a thorough reviewing the system of lifelong employment in Japan."

Questions for discussion

1. Explain why Japanese business is changing the hiring system?

2. What are the advantages and disadvantages of the new hiring system?

3. Will the Japanese try to apply the American system of employment and methods of assessing performance?

4. Is it possible to apply the former Japanese system of lifelong employment for Ukrainian companies? Why?

Task 1.

Determine the time for processing a batch of three heads of cattle, with a parallel-sequential type of movement of objects of labor if they undergo four operations of duration: t_1 = 8 minutes, t_2 = 3 minutes, t_3 = 5 minutes, t_4 = 9 minutes.

Solution:

$T_{par\text{-}seq} = 3 \times (8 + 3 + 5 + 9) – (3 – 1)(8 – 3) = 65$ minutes

Answer:

65 minutes

Task 2.

Calculate the rhythm of the production line, if the planned downtime is 3 % of the duration of the shift (480 minutes), the variable task – 155 boxes of products.

Solution:

The rhythm of the production line is determined by the leading equipment and is calculated by the formula $r = \frac{T \cdot \left(1 - \frac{K}{100}\right)}{N}$, where rhythm (beat) of the line, minutes/unit of product measurement; T – working time per shift, minutes; K – planned simple lines during the shift, %; N – production task in the change in units of production.

Answer:

r = (480 (1 – 3/100))/155 = boxes/hour

Task 3.

Calculate the required amount of equipment if the flow rate is 3 min / box; duration of operation at this workplace is 9 minutes.

Solution:

The required amount of equipment (n) is calculated by the formula: $n = \frac{T_o}{r}$, where n is the required amount of equipment; *To* - the duration of this operation (minutes), which is calculated as the ratio of the planned working time (minutes) per shift (day) to the productivity of the machine (unit of production) per shift (day); *r* is the rhythm of the flow.

Answer:

n = 9 minutes / 3 minutes = 3 machines

Task 4.

Determine the monthly need of the bakery for flour, its average and maximum stock, if the delivery period is 8 days, and the supply disruption period is 2 days. To ensure the implementation of the daily program should use 960 kg of flour, and its losses are 2%. During the month the bakery works 25 working days.

N min = 960*1,02 *2= 979,2*2 =1958,4 kilos

N aver = 1958,7+0,5*7833,6 = 5875,2 kilos

N current = 979,2*8=7833,6 kilos

N max = 1958,4 +7833,6 = 9792 kilos

Monthly need in flour = 979,2*25 = 24480 kilos =24 tons 480 kilos

Answer:

24 tons 480 kilos

Task 5.

Calculate the yield of finished products and identify reserves for growth of output due to more complete use of raw materials. The actual weight of raw materials entered production is 840 tons. The weight of finished products is 315 tons. Yield ratio of finished products in the previous year is 0.350; the industry average yield of finished products is 0.380.

Solution:

The yield of finished products is calculated as the ratio of the weight of the finished product to the weight of raw materials:

315/840 =0,375

This calculation shows that in comparison with the value of this ratio for the previous year, in the reporting year it is higher by 25 points (0,375-0,350)

From the available raw materials, it is possible to receive in addition production 0,025 * 840 = 21 tons.

Comparison of this indicator with the general industry allows us to conclude that the achieved level of output of finished products is lower than the industry average by 5 points (0.380-0.375).

If the enterprise had achieved an industry average, the output would have increased by 0.005 * 840 = 4,2 tons.

Answer:

4,2 tons

Task 6.

It took 18 minutes to process the part. After reviewing the time norms for this part, the norm of 15 minutes was set. Calculate by how many percent labor intensity decreased and productivity increased. The duration of the shift is 8 hours.

Solution:

Calculations can be made in several ways.

1. Since the indicators of labor intensity and labor productivity are inverse, the percentages of growth of productivity of P_{gr} and decrease of labor intensity of P_{decr} are connected by formulas.

$P_{gr} = 100 * P_{decr} / 100 - P_{decr}$

$P_{decr} = 100 * P_{decr} / 100 - P_{decr}$

Then labor intensity decreased by 16.7% = ((18-15) / 18) * 100), and labor productivity increased by 20% = (100 * 16.7 / (100-16.7)).

2. Production per shift was 480/18 = 26.7 pcs. After revising the time norms, it became equal to 480/15 = 32 pcs. Productivity growth

32/76 * 100 = 20%: labor intensity decreased by 16.7 % = (100 * 20/100 + 20)

Answer:

Productivity grows by 20 %, labor intensity decreases by 16.7%.

Task 7.

Determine the growth of labor productivity in conditional-natural measures according to the table

Product	Quantity of products		Labor costs per product, n-h
	plan	fact	
А	100	120	20
Б	250	225	15
В	760	820	5

The number of employees does not change

Solution:

For a unit of measurement (a conventional unit should be taken as a product with minimal complexity. Then in the conditional-natural measurement of production will be as follows:

Production according to the plan: 100 * 20/5 + 250 * 15/5 + 760 * 5/5 = 400 + 750 + 760 = 1910 units

Actual production

120 * 20/5 + 225 * 15/5 + 820 * 5/5 = 480 + 675 + 820 = 1975 units

The growth of labor productivity is 1975/1910 * 100 - 100 = 3.4%

Answer:

The growth of labor productivity is 3.4%.

Task 8.

Calculate the profitability of the bakery according to the table

Assortment	Annual sales, t	The total cost of the product, hryvnas	Sales price, hryvnas	Product weight, kilos
Wheat bread	70	0,63	0,75	0,9
Rye bread	62	0,49	0,55	1,0
Loaf	35	0,43	0,50	0,5
Pie	10	0,23	0,30	0,2

The average annual cost of fixed assets is 145 thousand hryvnas and normalized working capital of 20.5 thousand hryvnas

Solutions:

According to the data, you can calculate the profitability of individual products, product profitability and overall profitability.

Pi =(Price – Total Cost) / Total Cost *100

P Wheat bread = (0,75 – 0,63)/0,63 *100 = 19,04 %

P Rye bread = (0,55-0,49)/0,49 *100=12,24%

P Loaf = (0,50-0,43)/0,43 *100=16,28%

P Pie = (0,30-0,23)/0,23 *100=30,43 %

To calculate the profitability of bakery products one should calculate the incom from the sale of products (I_{real}) and the cost of goods sold (C_{real})

I_{real} = 0,75*7000/0,9 + 0,55*6200 +0,50*35000/0,5 +0,3*10000/0,2 = 0,75*77777,78 +0,55*62000+0,50*70000+0,3*50000=142433,33 hryvnas

C_{real}=0,63*77777,78+0,49*62000+0,43*70000+0,23*50000=49 000+30380+301000+11500=120980 hryvnas

Profit from sales is

$P_{real} = I_{real} – C_{real}$ =142433,33 – 120980,0 =21453,33 hryvnas

Profitability of goods

$P_g = I_{real} / C_{real}$ *100% = 21453,33/120980,0*100% = 17,73 %

Total profitability of production

P_{prod} = P_{real} / (Value of the basic funds + Value norm of the working capital) = (21453,33/(145000+20500)) *100 = 21453,33 /165000*100 = 12,96 %

Answer:

Total profitability of production is 12,96 %.

Topic 3. Operational system of the organization: structural and process characteristics

Practical lesson plan

I. Oral examination

1. General characteristics of the content of the operational strategy of the enterprise. The essence of operational strategy.

2. Operational priorities.

3. Working framework of operational strategy in production. Formation of strategy of production of the goods.

4. Features of the service sector that affect the operational strategy. Development of process strategy.

5. System approach in operational system management.

6. Operational system as an object of management. System hierarchy.

7. Features of operational (production) systems. Typology of operational systems.

II. Execution of educational tasks

Educational tasks

1. Group the following organizational systems according to the type of operational system: Zaporizhzhya Automobile Plant (ZAZ), nuclear power plant, agricultural household, university, oblenergo, machine-tractor plant, jeweler, law firm, railway station, poultry farm, oblavtodor.

Unique	Serial	Mass	Continuous
1.	1.	1.	1.
2.	2.	2.	2.
3.	3.	3.	3.

2. Fill in the table with products with different life cycles: TVs, knowledge, seasonal clothes, strawberries, newspapers, tickets to the touring theater, information on the stock exchange, telephones, Persian carpets, products sold at the rock festival with the logo of this festival, car, apartment.

Hours	Months	Years	Decade

Topic 4. Production process

I. Oral examination

1. Operational production process

2. The content of operational production management

3. Types of operational production management systems

4. The essence, features and decision-making procedure in production management

5. Modeling as a tool for justification and management decisions. Types of models and their use

6. The essence, principles and methods of forecasting

II. Execution of educational tasks

Educational tasks

1. What type of management decisions are used in the following examples:

a) The director of the agricultural enterprise basing on the opinion of the chief agronomist on the weather conditions this summer overturned his decision to raise such an agricultural crop as buckwheat.

b) The chief agronomist basing on his own experience suspended the process of raising beets as in his opinion a significant decrease in temperature at night is possible this Sunday.

c) The director of the agricultural enterprise sent the most promising accountant to the courses 1C-Accounting for further optimization of the accounting service of the enterprise with a possible reduction of employees in this service.

d) The director of an agricultural enterprise had a negative attitude towards one of his employees, and when the employee was late for work three times a month, the director fired the employee in accordance with labor law.

e) The chief zoo engineer basing on his own experience recommended the director to purchase new breeds of animals as he raised them at the previous enterprise.

e) The director of the agricultural enterprise decided to dismiss two machine operators for alcohol consumption in the workplace basing on the fact that other machine operators will learn such experience.

2. The agricultural enterprise plans to develop the livestock industry. Taking into account all stages of management decisions, make decisions on the construction and launch of a dairy complex.

The latest methods of adoption management decisions

1. The method of "brainstorming" is usually used when it is necessary to make an emergency, complex decision related to an extreme situation that requires managers to think hard and competent. In the course of a "brainstorming", various options are offered, even those that go beyond the usual techniques and methods of implementing such situations in normal conditions.

2. Method "Delphi" - multilevel questionnaire. The method is that the manager announces the problem and gives subordinates the opportunity to formulate alternatives. The first stage of formulating alternatives takes place without argumentation, i.e. each of the participants is offered a solution. Experts evaluate and invite subordinates to consider this set of alternatives. In the second stage,

employees must justify their proposals, solutions. Thus, the survey is repeated several times until the most optimal solution is selected.

3. The "Kingise" method is a Japanese circular decision-making system, the essence of which is that a draft innovation is being prepared for consideration. It is passed for discussion to the persons according to the list made by the head. Everyone should consider the proposed project and give their comments in writing. This is followed by a meeting to which employees are invited whose opinion is not completely clear or goes beyond the usual solution.

4. The method "Goal Tree" is a structured, built on a hierarchical principle (distributed by levels, ranked) set of goals of the economic system, program, plan, which highlights the general goal ("top of the tree"); subordinate to this sub-goal of the first, second and subsequent levels ("tree branches"). The name "goal tree" is due to the fact that the schematically presented set of goals distributed by levels resembles an inverted tree.

The concept of the "goal tree" was first proposed by Charles Churchman and R. Akoff in 1957. It allows a person to organize their own plans, to see their goals in a group. Whether they are personal or professional.

5. The Six Thinking Hats method is probably one of the most popular methods of thinking developed by Edward de Bono. The method of six hats allows you to structure and make much more effective any mental work, both personal and collective.

White hat: information is used to draw attention to information. In this way of thinking we are only interested in the facts. We ask questions about what we already know, what other information we need and how we can get it.

Red hat: feelings and intuition. In the red hat mode, the participants of the session have the opportunity to express their feelings and intuitive guesses about the issue, without going into an explanation of why it is so, who is to blame and what to do.

Black hat: allows you to give free rein to critical assessments, fears and caution. It protects us from reckless and ill-considered actions, points to possible risks and pitfalls. The benefits of such thinking are unquestionable, unless, of course, they are abused.

Yellow hat: logical positivity requires us to switch our attention to the search for the merits, benefits and positive aspects of the idea.

Green hat: creativity. Being under a green hat, we come up with new ideas, modify existing ones, look for alternatives, explore opportunities, in general, give creativity the green light.

Blue hat: process control differs from other hats in that it is not designed to work with the content of the task, but to control the process itself. In particular, it is used at the beginning of the session to determine what needs to be done, and finally to summarize what has been achieved and identify new goals.

6. Method "Five why?" It is used in various spheres of human activity in the process of analyzing problems and finding the root

causes of their occurrence. Ensure the search for the real causes of the problem in order to effectively solve them. Five "why?" - an effective tool that uses questions to study the causal relationships that underlie a particular problem, identify causal factors and identify the root cause. Considering the logic in the direction of "Why?", We gradually reveal the whole chain of consistently interconnected causal factors that affect the problem. Paying due interest to the principle of "Five Why?" it should be noted that this technique is not new. Since childhood, to find out something incomprehensible, we constantly ask the question "Why?" Origins of using the question "Why?" to analyze the problem and find the root cause of its occurrence are in the legacy of philosophers IV-III centuries. B.C. It is fair to say that the author of the causal concept used in logic for any proof, is considered Socrates.

Thanks to Toyota's production system (TPS), Sakita became Toeda. The number "five" is conditional. In fact, you may find that you have to ask questions less than or more than five times, building a logical chain before establishing the root cause of the problem. The search for answers to the questions included in the logical chain allows to structure the research situation, i.e. to develop a method of effective analysis of the problem.

7. The method of "rings". Many Japanese companies have used the "ring" decision-making system to some extent, which provides in-depth elaboration and coordination of decisions. The classic "rings"

procedure involved multiple approvals of a decision at several levels of government, from ordinary employees (one of whom is tasked with drafting a preliminary draft decision) to senior executives approving a decision that has passed all stages of approval. Coordination includes consultations at the level of ordinary employees of different departments (conducted by the employee responsible for the preparation of the preliminary draft decision), at the level of heads of departments and other departments (carried out in the form of circulating draft decisions on all departments relevant to this issue), and then senior managers - deputies and heads of departments or divisions. By the end of the circulation, the draft document is endorsed with the personal seals of dozens of chiefs of various ranks. In case of disagreement during the preparation of the decision at one or another level, consultative meetings of the heads of the relevant level are convened, during which an agreed position is developed. Such decision-making practices are quite complex and time-consuming, but most Japanese corporations are slow to make decisions, hoping that the "rings" procedure, which ensures coordination of actions at the decision-making stage, facilitates coordination of their further implementation.

The system has unconditional advantages. However, it is not without some drawbacks. It is believed that the procedure should provide an influx of new ideas and freedom of opinion when discussing decisions. But this is not always the case. Sometimes, in

conditions of rigid hierarchy and respect for superiors, such a process is reduced to attempts by subordinates to guess the opinion of leaders, rather than to promote their independent point of view. As such, the "ring" system has often become a complex and not always useful mechanism that takes a lot of time from managers and employees of different ranks to agree on decisions.

Therefore, there is a gradual reduction in the sphere of influence of the decision-making method "rings". This is due to a number of reasons, including the widespread use of planning and budgeting methods in Japanese firms (due to this, there is no need to make decisions on many issues by the traditional method). Given that long-term planning is used, according to available data, by 83% of Japanese firms, the scale of such changes is quite significant. 63% of Japanese companies have strengthened their decision-making powers, which has led to a reduction in the scope of the "ring". 4 % of Japanese companies had the ring system eliminated altogether by year 1974.

8. Method 635. A group of six participants analyzes and formulates a given (problem) situation. Each participant enters in the form three proposals for solving the problem (within 5 minutes) and passes the form to a neighbor, fills in the form and takes note of the proposals of his predecessor, and under them in three fields makes three more own proposals. These proposals can be used in the further development of recorded solutions, but new ones can be put forward. The process ends when participants have processed all forms.

Topic 5. Production strategy and competitiveness of the enterprise

I. Oral examination

1. Economic strategy of the organization and features of its development.

2. Models of choosing options for economic strategy of the organization.

3. The essence of the production strategy. Strategy and tactics in the system of operational management.

4. The essence of the project approach to the management of the organization.

5. Project planning: list of works to do.

6. Methods of network planning: advantages and disadvantages.

II. Execution of educational tasks

Educational tasks

You are the director of the Fertilizers and Pesticides chain of stores. Your stores work very well: they fulfill the plan of selling goods (sometimes even over fulfill), there are no problems in the team, there are good reviews from suppliers and buyers. Only one of the stores does not constantly perform its tasks, there is a high turnover of staff, reduced sales, there are complaints about customer service. It is necessary to identify the main problems in the activities of the store,

to propose measures to solve them, as well as to analyze and evaluate the consequences of these decisions.

Choose five options from the proposed solutions and prioritize them. Justify the choice:

Task

1. Which of the ways to manage the company's employees do you consider appropriate: to order or consult with subordinates, how to more effectively solve a problem? Justify the choice.

2. What do you see as the advantages of informal management compared to directive?

Alternative solutions to problems in the store

Measures	**Estimation of measures**
1. Close the store and to provide the premises for renting	
2. Dismiss the general manager and hire a young specialist	
3. Transfer a more experienced manager from another store that belongs to you	
4. Identify in the store employees-initiators of any dubious measures and dismiss them	
5. Raise the questions about the state of discipline and attitude to work in the store at the general meeting	
6. Improve the system of material and moral incentives, allocate additional bonus fund	

7. Take measures to reorganize the internal environment	
8. To hold a seminar for the staff of the store on the organization of labor and personnel management	
9. Send the store manager to advanced training courses for managers	
10. Increase the cost of advertising this store	
11. Introduce accumulative discount cards for regular customers	
12. Carry out a number of promotions of goods that can be purchased in this supermarket	
13. Equip a place for parking customers' cars near the supermarket	

Topic 6. Planning and projecting in the operational process of the enterprise. Project Management

I. Oral examination

1. Discover the essence and goals of project.
2. Name and describe the stages of projecting in operational management.
3. Discover the essence of the project approach to operational management.
4. How can projects be classified?
5. Give the definition of project management and reveal its essence.
6. Describe the essence and stages of project planning.

II. Execution of educational tasks

Using of the "decision tree" in operational management

To find the optimal solution when there are more than two alternatives provided, it is advisable to use the approach using the "decision tree".

A decision tree is an approach that provides a graphical representation of the process by which alternative solutions are identified as well as the corresponding probabilities for each combination of alternatives.

The following steps are performed in the process of using the decision tree:

1. Identifying and considering all possible alternatives to the solution (including the "do-nothing" alternative).

2. Indicating of the expected result of the implementation of the alternative in monetary terms (at the end of each alternative). Be sure to indicate the probability of obtaining this result (the sum of the probability coefficients for positive and negative market situations is 1).

3. Determining the expected result (income, expenses) of each alternative. The decision tree analysis starts on the right side towards the beginning of the diagram. Alternatives that are not better than others are excluded from the further analysis at each stage.

Task

1. A private enterprise plans to become engaged in food production. The possibility of production of chips, pasta or

“varenyky” is considered. The research conducted by the operations manager allowed to determine the annual income for each type of production under favorable and unfavorable market: the production of chips under favorable conditions will generate an income of 300 thousand hryvnas, under adverse conditions, possible losses in the amount of 200 thousand hryvnas; production of pasta - under favorable conditions, the income will be 250 thousand hryvnas, for adverse losses - 100 thousand hryvnas; production of “varenyky” - under favorable conditions, the income will be 75 thousand hryvnas, under adverse conditions, losses - 18 thousand hryvnas. The probability of a favorable and unfavorable market is the same.

Task:

1. Analyze the effectiveness of strategic alternatives using the "decision tree".

2. Identify the most successful project for a private enterprise.

3. Based on the results of the calculations, make a report to the owner of the enterprise with the argumentation of the choice and proposals for the practical implementation of the chosen option.

Individual task.

Assess the factors of the enterprise environment that affect the implementation of its operating strategy. To perform the task you need:

1.1. to analyze and assess the factors of the external environment of the enterprise of a particular field of activity: competitors, suppliers,

consumers (buyers, customers). You should indicate at least three positive and negative characteristics for each factor;

1.2 to analyze and evaluate the factors of the internal environment of the enterprise: production / operations, marketing, finance. Identify at least three positive and negative characteristics for each factor.

1.3 Enter the results into the table.

The results of the analysis of environmental factors of the enterprise

Factor name	**Positive characteristics**	**Negative characteristics**
External environment		
Competitors		
Suppliers		
Consumers		
Internal environment		
Production		
Marketing		
Finance		

2. Commodity experts informed the head of the trade department about the new requirements of suppliers. This will put an extra burden on the department. The manager identified three possible options for how to cope with the increased functional load. The first option is to redistribute responsibilities among existing staff, the second is to hire and train two new employees, and the third is to redesign current activities so that you can work with suppliers according to the new

requirements. Estimated data for different options and workload are given in Table 1.

After analyzing the workload, the head of the sales department determined that the probability of workload will be: 0.10 - for moderate workload; 0.30 - for high workload; 0.60 - for very high workload.

Task:

1. Construct a "decision tree" to address the issues related to reducing the additional workload on sales staff.

2. Justify the choice of the solution that will optimize the end result.

3. Prepare an administrative act on the practical implementation of the selected decision (an order)

Workload distribution among the possible options

Option number	**Options**	**Workload, thousand hryvnas.**		
		moderate	**high**	**very high**
1	Redistribution of responsibilities	50	60	85
2	New employees	60	60	60
3	Redesigning of current activities	40	50	90

Topic 7. Management of material resources

I. Oral examination

1. Economic strategy of the organization and features of its development.

2. Models of choosing options for economic strategy of the organization.

3. The essence of the production strategy. Strategy and tactics in operational system management.

4. The essence of the project approach to the management of the organization.

5. Project planning. Postoperative list of works.

6. Methods of network planning: advantages and disadvantages.

II. Execution of educational tasks

Educational tasks

"Forecasting the productivity of agricultural enterprises"

Succeeding in agribusiness is twice as difficult as in industrial enterprises. The rules of the game are often changed by the authorities, and the high risk of crop losses repel large capital from the countryside. Thus, the natural working conditions in agriculture and the quality of land should be considered as a prerequisite for achieving a particular value of economic effect. Land in its quantitative and qualitative characteristics is a necessary element of production resources, which determine the capital of labor, and, accordingly, the efficiency of production. In the annual reports of agricultural enterprises, labor productivity is determined by the ratio of gross output in monetary terms to the average annual number of employees

employed in agriculture. This indicator has certain shortcomings. However, in agriculture you can earn a lot of money and achieve significant productivity. To do this, it is necessary to competently organize business management and establish a constructive dialogue with the authorities.

Consider, for example, how you can succeed in agriculture. Dmytro Piddubny has been managing an agricultural firm in the village of Krasionivka, Chornobayiv district, Cherkasy region.

In the process of work, he faced the problem that the grain market of Ukraine is rigidly divided between several large companies. D. Piddubny understood that with such unequal financial and lobbying opportunities, no domestic company will be able to compete in this market segment for a long time. In recent years, the vast majority of managers have complained about the lack of agricultural workers. D. Piddubny also considers the problem with personnel to be one of the main ones. To hire and retain highly qualified professionals, it provides them with housing, company cars, uses a clear system of bonuses and staff training. Although even with high wages there are problems due to unsatisfactory work of machine operators.

In agriculture, due to the seasonality of production, a low level of labor organization compared to other sectors of the economy, there are significant losses of working time. It is very difficult to find a good manager in rural areas. At the same time, it is difficult to maintain a control system in all structures. D. Piddubny made a lot of efforts to

establish an effective control system, creating a mini-management of agriculture. One person from the central office goes to the place, performs all the necessary work, is present at the closing of the outfits.

Tasks for situational exercise

1. Analyze what measures D. Piddubny takes to solve the problem with personnel.

2. What skills of the manager are most important for increase of productivity in the agrarian market?

3. What shortcomings are observed in the annual reports of agro-industrial enterprises?

4. On the example of D. Piddubny's activity, explain why it is important to use labor resources effectively.

Glossary

ABC analysis is a widely used method in the practice of inventory management, which involves the division of material resources into categories A, B and C. ABC analysis emphasizes that there is a critical minority (category A) and a trivial majority (categories B and C) of positions material and resource resources to which different management policies should be applied; the main focus should be on a critical minority of positions.

Aggregate planning is the process of forming a resource-balanced production program of the enterprise and its distribution by individual calendar periods and by individual structural units of the operating system.

An enterprise is an independent business entity established by a competent state authority or local self-government body, or other entities to meet public and personal needs through the systematic implementation of production, research, trade and other economic activities.

Areas of operational management are management of stable operation of the operational system and management of its creation, transformation and development.

Calendar-planning standards are tools for interconnection of calendar plans, coordination of work of interconnected workplaces, sections and divisions, as well as ensuring efficient use of equipment and personnel. The main calendar and planning standards are: the size

and rhythm of batches of parts, assembly units and products, the duration of production cycles; anticipation of the launch and release of batches of parts and assembly units; reserves and standards of work in progress.

Cause-and-effect diagram is a tool that allows you to identify the most significant factors that affect the end result. It is usually used to analyze the defects that lead to the greatest losses. At the same time it is possible to analyze the four main causal factors: personnel, machine (equipment), material and method of work. Based on this, such a diagram is sometimes called a diagram of "four M" (*man, method, material, machine*).

Certificate of quality system is a document issued to the company by the certification body of quality systems and certifies compliance with the requirements of the regulatory document (standard), as well as confirms the ability of the company to ensure and maintain the quality of its products at the appropriate level.

Checklist is a tool for collecting data and automatically organizing them to facilitate further use and processing of collected information.

Competitiveness of the enterprise is the potential or realized ability of the economic entity to effectively operate for a long time in a relevant environment. Competitiveness is based on the competitive advantages of the enterprise, determines its ability to withstand

competition in a particular market, reflects the position of the enterprise relative to its competitors.

Comprehensive quality management system (TQM-system) - in the broadest sense - is a management approach focused on achieving long-term success by the company through the fullest satisfaction of customer requests. The ideology of TQM is based on the principle of continuous quality improvement. In a narrow sense, it is a comprehensive system focused on continuous improvement and improvement of quality, minimization of production costs and delivery on time. The TQM system provides for the general, purposeful and well-coordinated application of quality management systems and methods in all areas of activity - from research to after-sales service - with the participation of management and employees at all levels and in the rational use of technical capabilities.

Control card is a tool that allows you to track the nature of the process and influence it, preventing it from deviating from the requirements of the process standard. This is a kind of graph, which differs in the presence of control limits, which mean the allowable range of scatter of characteristics in stable conditions of the process.

Costs for ordering and execution are costs associated with the organization of the order and its implementation. They include costs of forming a supply network; costs of evaluation and selection of a specific supplier; transport, entertainment, postage; travel expenses,

etc.; the cost of registration and execution of the order does not depend on its size.

Craft strategy is a strategy on the basis of which production is built, in which workers-universals manually or using simple, multifunctional tools produce small batches (units) of products in accordance with individual customer requirements.

Critical resource means resources, the availability, quality and efficiency of which are vital for the successful implementation of operational activities and the functioning of the organization as a whole.

Current stocks are stocks of inventory ensuring the continuity of supply of the production process between two regular deliveries. The main purpose of creating such stocks is to eliminate the need for hourly deliveries and ensure the continuity of operating activities.

Deming Cycle (DC) is a modern methodology of improvement, which is based on the consistent implementation of 4 functions: planning, execution, verification, corrective action, through the implementation of which the impact of the quality system on the production process is provided. It is based on the assumption that improvement is the result of the application of knowledge accumulation.

Dispatching is the process of continuous monitoring and operational regulation of production in order to ensure the

implementation of the plan in accordance with the established calendar schedule.

Effectiveness is the total result of the system and the accumulated potential for further development. Performance is a multicriteria value; its main criteria are: efficiency, profitability, efficiency, productivity, quality, innovation, quality of working life, market position of the enterprise.

Environmental Management System (EMS) is a system based on the group of ISO 14000 standards which unlike many other environmental standards are not focused on quantitative parameters (emissions, concentration of matter) and not on technology, and the formation of satisfactory environmental behavior at three levels: organizational - through improving the environmental "behavior" of corporations; national - through the creation of a significant addition to the national regulatory framework; as a component of state environmental policy.

External environment of the operational system is a set of variables that are outside the operational system; it consists of the immediate environment of the operational system, which is formed by other systems of the organization (financial, marketing, etc.), and the external environment of the organization.

Firm is a general term for any commercial enterprise, i.e. an enterprise established for profit.

Flow production means production characterized by the following features: a group of jobs is assigned to the processing or assembly of a product of one name or a limited number of product names that are related in structural and technological terms; jobs are located in accordance with the technological process; the technological process of manufacturing products is divided into operations; one or a limited number of related operations are performed at each workplace; items are transferred from transaction to operation piecemeal or in small transfer batches.

Functions of operational management are separate from each other, relatively independent types of management activities. The main functions of operational management are goal setting, planning, organizing and coordinating, motivating, controlling and regulating.

G. Taguti's methods are a set of approaches to quality management aimed at implementing the idea of quality improvement in the case of product planning taking into account variations and uncertainties.

Gantt chart (Gantt chart, bar chart) is a graphical representation of the plan of a certain set of works during a specific period; variety of bar charts. It represents the segments located on a horizontal time scale; each of the segments corresponds to a separate work (task). The tasks that form the plan are placed vertically; the beginning, the end and length of a segment on a time scale correspond to the beginning, the end and duration of work. Gantt chart is used to

plan work complexes, present the current state of work, control the production process.

Going beyond the **control limits** means a violation of the stability of the process and requires analysis of the causes and taking appropriate measures.

Guarantee stocks (insurance, reserve) are stocks of inventory designed to ensure the continuity of the production process in case of unforeseen circumstances: deviations in the frequency and volume of actual batches of supplies from the contract, changes in consumption, delays in delivery, etc.

Histogram is a tool that is a bar graph and allows you to visually estimate the law of distribution of statistics. It is used to display the distribution of specific values of the parameter by the frequency of its repetition for a certain period (week, month, year).

"Just-in-time" system (JIT-system) - in a broad sense - is a production philosophy, the main idea of which is the continuous improvement of products and the systematic removal of all unnecessary, i.e. all that leads to an increase in its value without increasing its consumer value. In the narrow sense, it is a system of chain management "supply-production-sales"; the basic principle of this system is the production and delivery of the necessary inventory to the required place and in appropriate quantities exactly at the time when they are needed. It is based on the use of a "pulling" approach to workflow management - parts and semi-finished products are fed

to the next technological operation as previously required, i.e. each work site performs work according to the request of the next work site, no rigid production schedule. The application of the system allows the company to approach the implementation of the concept of "Production with zero stock" ("Production without a warehouse").

1) ensuring the stable operation of the operational system for production, works or services in the planned volumes in a timely manner at the appropriate level of quality with maximum performance while maintaining the optimal level of operational system flexibility which guarantees its suitability for renewal and development;

2) initiating and supporting changes in elements, processes, parameters, structure of the operational system to transfer it to qualitatively new levels of operation with minimal resources and time based on a combination of external opportunities and internal resources of the organization.

Integrated system for high-quality equipment (TPM-system) is a system that provides the optimal combination of efficient use of production capacity and the cost of maintaining them in working order by reducing breakdowns and downtime (including through readjustment), as well as increase productivity and improve equipment. It covers not only the maintenance of production facilities during their operation but also the design and manufacture of these facilities, provides active participation in the process of improving the use of equipment of employees of all levels, all services and

departments of the enterprise. A characteristic feature of the TPM system is the operation of the equipment by operators grouped into small groups working on this equipment. Also known as the General Operational System.

Inventories are stocks that are expected to be included in the process of production or personal consumption. Inventories formed in the operational system consist of products of different levels of readiness and include: stocks of raw materials, basic and auxiliary materials, semi-finished products, parts and components; inventories of work in progress; stocks of finished products.

Inventory management is an aspect of operational management the main object of which is the inventory formed in the operational system and its purpose is to reduce excess inventory and stabilize delivery times, i.e. periods of time from placing an order for inventory to receipt enterprise of the necessary resources.

Inventory storage costs are costs associated with the current maintenance of existing stocks, as well as costs arising from the withdrawal of inventories of the enterprise; inventory storage costs increase in direct proportion to the increase in the size of the order.

Kanban (Japanese) is a term meaning "signal" or "visual record".

Kanban system is a system of organization of production and material and technical supply, which allows to fully implement the principle of "Exactly on time". When working on the "Kanban"

system, the manufacturer does not have a strict work schedule; it is not bound by a general plan, but by a specific order of the consumer shop and optimizes its work within this order. There is no specific production schedule for the decade and month; it is actually formed by the circulation of selection cards and Kanban order cards. The Kanban system is based on interaction with a narrow range of suppliers, which are selected on the basis of the ability to guarantee the delivery of high-quality components exactly on time.

Labor rationing is the process of establishing the necessary time to perform a particular job.

Laws of organization of operational systems are the necessary, essential, established relationships between the elements of the operational system, as well as between this system and its external environment. Laws of organization of operational systems are interdependent and interdependent; they are divided into two groups, i.e. the laws of statics of the system (manifest themselves in structures) and the laws of dynamics of the system (manifest themselves in the processes of development).

Management is a function of organized systems of different nature (biological, social, technical), which ensures the preservation of their structure, maintaining the mode of operation, the implementation of their programs and goals.

Management methods are ways to influence employees and production teams in general, ensuring the coordination of their

activities in the process of achieving goals. All methods of operational management according to the composition and nature of the impact on the objects they manage, are divided into the following four groups: organizational, administrative, economic, socio-psychological.

Model is a conditional image of an object of study designed to simplify that study.

Model of optimal size of order is a model that aims to determine the optimal (economic) volume of the order, based on the criterion of minimizing the amount of two types of inventory management costs: the cost of registration and execution of the order and the cost of inventory storage.

Modeling is research of objects of cognition by means of models; a powerful tool for scientific knowledge and solving practical problems, widely used in science and in many areas of practical operations.

MRP-I system is a system of organization of production and logistics. Also known as "Small MRP", "First Generation MRP", "Material Needs Planning System". The basic principle is that all materials, components and components of the product must arrive at production on time to ensure the creation of the final product without any delays. It is based on the use of a "push" approach to workflow management - parts and semi-finished products are fed to the next technological operation in accordance with a strict production schedule; implemented through a computer program that allows you

to regulate the supply of components in the production process, while controlling stocks in the warehouse and the course of production.

MRP-II system is a system of organization of production and logistics. Includes the functions of the MRP-I system, such as planning the needs for inventory, as well as a number of other functions (automated design, process control, etc.). Like the MRP-I system, it is implemented through a computer program. Also known as "second generation MRP", "Production Resource Planning System".

Non-flow production means production characterized by the following features: at workplaces are processed different in design and manufacturing technology items of labor; Workplaces are arranged in typical groups without any connection with the sequence of operations; in the manufacturing process, parts are moved by complex routes.

Objectives of operational management:

Operational cycle is the time of one operation, during which one part is made, a batch of identical or several different parts; consists of the sum of durations of technological time and breaks of party affiliation; serves as a basis for determining the production cycle.

Operation is a part of an operational process carried out on a certain object of work (object of operational activity) at one workplace by one employee. It is characterized by the immutability of the subject of labor, workplace and performer.

Operational activities are purposeful activities to create any utility (any tangible and intangible benefits). It covers the production of material products, and the provision of services, and the performance of any other work in any field of activity.

Operational control is the process of comparing the actual parameters of products, technology, the course of the production process with the normative values and regulation, if necessary, i.e. the course of production. It is implemented on the basis of operational accounting and operational analysis.

Operational function includes all actions performed in the operational system, as a result of which products are produced, which are supplied by the organization to external consumers. The essence of the operational function is the conversion (transformation) in a series of actions called operational processes, through which the inputs of the operational system are converted into end results.

Operational management means management actions aimed at ensuring the effective functioning of the operational system of the organization and achieving the goals set before it; the process of planning, organizing and coordinating, controlling and regulating the processes of production of certain volumes of products, performance of works or provision of services carried out within a specific enterprise (institution, organization); the process of making and monitoring the implementation of management decisions that ensure

the successful implementation of the operational function of the organization.

Operational planning is the process of establishing or clarifying and specifying the production goals of the organization as a whole and structural unit of its operational system, determining the means of achieving them, timing and sequence of their implementation, identifying needs, resource allocation.

Operational process is a set of completed interconnected actions, which together create a certain utility that has value for the consumer to the customer; a set of actions of people, means of operational activities and nature for transformation of objects of operational activity into its final results. The operational process consists of operations.

Operational strategy is a set of interrelated decisions (technological, economic, organizational and resource) to streamline the operational activities of the organization to achieve its strategic competitive advantages; one of the functional strategies of the organization.

Operational system means one of the systems of organizations in which the implementation of the operational function is carried out, i.e. production, provision of services, performance of works.

Operational system planning is a plan of the spatial arrangement of the material components of the operational system. It is customary to distinguish between planning on the subject principle

(linear), on the technological principle (functional) and on the principle of group technology.

Operational-calendar planning is the process of establishing a place (operational system unit, site, workplace), time (quarter, month, decade, change), volume and sequence of operations for the manufacturing of products or services in accordance with the production program of the enterprise. It is divided into inter-shop and intra-shop.

Optimal production program is a production program provided by sales, which best corresponds to the resource structure of the organization, which guarantees the best results according to the accepted criterion (as the criterion of optimality is most often used maximum profit).

Optimal size of the order is the size of the order, which provides the minimum amount of total costs for inventory management (costs for registration and execution of the order and the cost of inventory storage).

Order point is a parameter that indicates the lower limit of the stock after which it is necessary to organize the next purchase order. The level of stock at the time of ordering should be sufficient to continue the smooth operation of the operational system, and the insurance stock should remain intact.

Planning and accounting unit is the accounting unit of work accepted in the organization for planning purposes; the composition

of planning and accounting units is the most important characteristic of the operational planning system. The main planning and accounting units are: detail of each name; a set of parts included in one assembly unit; a set of parts that are part of different assembly units, but have the same calendar and planning standards (advance on the issue, the rhythms of the parties); order in general, i.e. the whole set of parts and components of the product of one name.

Preparatory stocks are stocks of inventory, created in case of need for additional preparation of material resources for use in the production process.

Process approach is the application within the organization of a system of processes together with their definition and interaction, as well as their management. For an organization to function effectively, it must identify and manage a number of interrelated activities.

Process is a set of interconnected actions that turn inputs into outputs. Inputs include all types of resources consumed by the organization, customers and their property. Outputs are the result of purposeful activities within the process, as well as additional outputs in the form of information, experience, negative impacts on the environment and so on. The inputs of one process are usually the outputs of other processes.

Product is the result of operational activities; may be submitted in material form (material products), in information form (intellectual products) or in the form of work performed and services provided.

Product life cycle is a set of production processes, processes of circulation and consumption of products of a certain type from the beginning of the study of the possibilities of its creation to the cessation of its consumption and disposal.

Product quality is a set of properties and characteristics of the product that provides the ability to meet established or anticipated needs (established needs - fixed in legal norms, standards, orders, agreements, specifications and other documents; anticipated needs - those expectations that the consumer usually does not formulates specifically, but refers to established wishes).

Production - in a broad sense - is the process of creating goods; in a narrow interpretation it is the manufacture of material products carried out at industrial enterprises.

Production function is a function that shows the maximum possible output that can be achieved during the calculation period for each specific combination of factors of production.

Production management is a set of consistent actions of management to determine the objectives for the object of management (production) and their actual state on the basis of registration and processing of relevant information, the formation and approval (decision-making) of economically rational production programs and operational tasks. The general functions of production management are organization, rationing, planning, coordination, motivation, control and regulation.

Production program is a plan of the enterprise for production, performance of works, provision of services, which contains a specific set of tasks on the volume of production of a certain range and range and proper quality for a certain calendar period (usually one year).

Production structure is a set of purely production units (shops, sections, service farms and services), which directly or indirectly participate in production activities, their number and composition, the links between them.

Productivity is a characteristic of the ability of a particular enterprise to perform the same amount of work less than others to spend resources. It is determined by the ratio of production volumes (services) and the cost of their creation (logistical, technological, raw materials, spatial, personnel, energy, information, time).

QFD method is a technology of structuring the quality function, which is a systematic way to study the needs and desires of consumers through the deployment of functions and operations in the company's quality assurance at each stage of the product life cycle, which would ensure the end result that meets consumer expectations. It is used to convert consumer requirements into quality parameters of the expected product, as well as the compliance of certain parameters with the quality requirements of the processes of planning, development, production and improvement of the product.

Quality control is an activity that involves measuring, examining, testing and evaluating one or more characteristics of an

object and comparing the results with the established requirements to determine the degree of conformity for each of these characteristics.

Quality group is a group of employees of a particular unit of the operational system (shop, department, site, etc.), who voluntarily and regularly meet to identify and analyze real or potential quality problems of the organization, as well as to develop solutions and proposals to management or implement their own decisions.

Quality is the level to which the set of own characteristics of a product, process or system meets the stated needs or expectations.

Quality level is a relative characteristic of product quality, based on the comparison of the values of quality indicators of the evaluated products with the basic values of the relevant indicators.

Quality loop is a schematic representation of interdependent activities that affect quality at different stages of the product life cycle: from identifying needs to assessing the level of their satisfaction. From the point of view of quality management, the "quality loop" is a model of the impact of the quality system on the process of creating products or providing services through the consistent implementation of the functions of administrative and operational management.

Quality management includes coordinated management activities to manage the organization in relation to quality.

Scatter chart (correlation chart) is a tool that builds a graph of the relationship between two parameters and allows you to determine the type and density of the relationship between them. By having such

a relationship, the deviation of one of the parameters can eliminate the impact on the other.

Seasonal stocks are stocks of inventory which are formed by the seasonal nature of production, consumption or transportation. The main purpose of creating such stocks is to ensure the stable operation of the operational system for the period of seasonal breaks in production, consumption or delivery.

Situational approach is a methodological approach in which the main task of the operational manager is to correctly link the general approaches and management concepts with the realities of a particular situation in order to most effectively achieve the goals of the operational system of the organization. It is an attempt to identify relevant situational variables and to find out how they affect the efficiency of operational activities. The situational approach is aimed at realizing the possibilities of direct application of scientific provisions to specific conditions of specific situations.

Stakeholders are groups of people who have a certain interest in the results of the organization, which include investors, customers, employees, company management, society, suppliers.

Standard is a regulatory and technical document that establishes the basic requirements for product quality. Standards define the procedure and methods of planning to improve product quality at all stages of its life cycle, set requirements for tools and methods of quality control and evaluation. Product quality management is carried

out on the basis of state, international, industry standards and enterprise standards.

Standardization is the activity of establishing in regulatory documents certain requirements (norms, rules and characteristics) in order to ensure the safety of products (services) for the environment, life, health and property of consumers; technical and information compatibility; product interchangeability; quality of products and services in accordance with the level of development of science, technology and engineering; unity of measurements; safety of economic facilities, taking into account the risk of natural and man-made disasters and other emergencies.

Statistical acceptance control is sample control, which makes it possible to assess the quality of a batch of products based on the results of control of a certain sample taken from this batch.

Statistical precautionary control is selective control which makes it possible to assess the quality of the technological process by checking samples that are periodically taken from products that have been processed at a certain stage of production (operations). Process quality control is used to regulate the stability of technological processes and is carried out directly during the production or provision of services.

Statistical quality control is a scientifically based method of sample control based on probability theory and mathematical statistics, which allows not only to establish the actual level of product

quality, but also to actively influence the production process, i.e. to ensure its regulation. It is established to distinguish between statistical acceptance and statistical preventive quality control.

Strategy of mass production is a strategy on the basis of which large-scale machine production is built. It is specialized in the production of large volumes of products homogeneous in purpose and design and technological features. It provides maximum standardization and unification of components and parts. Strategy of mass production is characterized by a high level of complex mechanization and automation of all major technological processes.

Strategy of serial production is a strategy on the basis of which the production of products is built in large batches (series), repeated at certain intervals, possibly with the subsequent modernization of products. Enterprises with serial type of production specialize in the production of products with a relatively narrow range.

Strategy of unit production is a strategy on the basis of which the production of different types of products in one or more copies or small series. A wide range of materials and universal technologies are used in unit production. Most often, this strategy is used by companies specializing in the manufacture of products to individual orders.

Strategy, the key priority of which is quality is production strategy focused on the introduction of quality at all stages of production to meet customer requirements; quality criteria are applied not only to the product or service provided to the consumer, but also

to all relevant processes - development, design, production, after-sales service of the product.

Strategy, the key priority of which is time is production strategy, the basic priority of which is to reduce the time of operations (development and production of new products or services, responding to changes in consumer demand, supply of products or services, etc.). The basic idea is that by reducing response time, costs are usually reduced, productivity is increased, new products are brought to market faster, and customer service is generally improved.

Structure of the operational system is a set of elements and relationships between them that ensure the integrity of the operating system, i.e. the preservation of its basic properties under various external and internal changes. It is determined by the composition and relationships of its elements and subsystems, as well as relationships with the external environment.

Subjects of operational management are certain persons who carry out the implementation of the objectives of operational management. These persons include: representatives of senior management of the organization which make strategic decisions in the field of operations; middle and lower management operational managers responsible for the development and implementation of current operational plans to maintain the stability of the operational system and others.

System approach is a direction of research methodology, which is based on the consideration of the object as a whole set of elements in the set of relations and connections between them, i.e. the consideration of the object as a system. The systems approach is focused on revealing the integrity of the object; to identify the various types of connections in it; to highlight the patterns and specific properties of the object that determine its structure and, accordingly, the organization.

System is a set of elements that are in relationships and connections with each other and form a certain integrity, unity; basic concept of system approach. According to the nature of the relationship of parameters with the environment, systems are divided into open (systems that exchange matter, energy, information with the environment) and closed (isolated systems that do not exchange matter, energy, information with the environment).

System of "fixed time" inventory management system is one of the two basic inventory control and management systems, in which fixed values (regulatory parameters) are the order interval and the maximum level of stock in the warehouse. Orders for replenishment of stocks are placed with the specified frequency; the volume ordered is different each time and depends on the stock in the warehouse at the time of placing the order.

System of inventory management "with a fixed quantity" of the order is one of the two basic systems of inventory control and

management, in which fixed values (regulatory parameters) are the volume of the order and the point of the order. The level of stocks is constantly monitored; when the quantity of material or raw material decreases to a certain level (order point), the next order for replenishment of stocks is issued, thus the same volume is always ordered.

System of operational management is a set of interconnected structural elements that ensure the coordinated interaction of the operational system units to implement the goals set for them. The main elements of the management system are: goals and objectives; object and subject; methodology and principles; functions and management methods.

System of operational management of operational activities is a complex organizational and planning system, the main purpose of which is to ensure the rhythmic operation of the enterprise for the production of products (services) in accordance with the established plan by controlling and regulating the processes of its implementation. The main functions of operational management are operational planning and operational control (dispatching).

System of optimized production technology (OPT-system) is a computerized system of organization and production of its management, focused on the prevention of "bottlenecks" in the chain "supply-production-sales".

The concept of "Six Sigma" is a concept of business improvement, the main purpose of which is to find and eliminate the causes of defects and errors in production and service processes, focusing on results that are critical for the consumer and clear financial indicators of profitability. The theoretical basis is the developed provisions for assessing the ability of a statistically controlled process to meet the specified requirements, taking into account the variance of characteristics.

The concept of lean production (Lean production-concept) is the concept of creating efficient production using limited resources.

The concept of uninterrupted information support of the product life cycle (CALS-concept) is the concept of organization and integrated information support of the product life cycle adopted in most industrialized countries. It is based on paperless data exchange and standardization of data presentation at each stage of the life cycle. The area of the most expedient application is the design and creation of complex high-tech products.

The method of FMEA-analysis is the technology of analysis of the possibility of defects and their impact on the consumer, its task is to identify those defects that cause the greatest risk to the consumer, identify their potential causes and take corrective action before these defects appear, and thus prevent the cost of correcting them.

The method of organization of production is a way of carrying out the production process, a set of tools and techniques for its

implementation. It is characterized by a number of features, the main of which is the relationship of the sequence of operations of the technological process with the order of the equipment and the level of continuity of the production process.

The Pareto chart is a tool that allows you to see the number of losses depending on the various defects, focusing on the elimination of those defects that lead to the greatest losses.

Time rate is the amount of labor costs set to perform a unit of work (products) by an employee (group of employees) of the appropriate qualification under certain organizational and technical conditions of production.

Usefulness is the ability of a product or service to meet certain needs of consumers. It is customary to distinguish the usefulness of form, place, acquisition, condition, time.

Virtual enterprise is an association on a contractual basis of firms involved in product lifecycle support processes and operating on the basis of a common system of information interaction standards. The creation of such enterprises is widely used in the organization of work on the basis of the CALS-concept. Within virtual enterprises, joint projects for the development, production, marketing and service of various types of knowledge-intensive goods are implemented.

When applying these methods, the emphasis is on the so-called non-productive regulated quality (in the process of planning the experiment) and the use of "loss function G. Taguti", which can

calculate the amount of quality loss in value terms, deviating from the target value of quality indicators.

Practical tasks for self-preparation

Task 1.

Task:

Determine the required number of ovens to fulfill the daily order in the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;
- the company operates in three shifts, the duration of one shift is 8 hours.
- technological norm of furnace productivity is 2.9 tons of loaves per shift;
- time of regulated breaks during the shift is 20 minutes;
- baking time of the loaf is 31 minutes;
- the number of pipes in the oven is 24 pcs.;
- planned yield of loaves from one ton of flour is 134.6%;
- flour is delivered in bags. Weight of one bag is 70 kg;
- technological productivity of the flour-sifting unit is 2,5 tons in change;
- weight of flour in one bowl is 120 kg;
- technological productivity of the dough divider is 6100 dough blanks;
- rate of waste in the dough division is 4%;
- weight of one dough blank is 0.5 kg.

Task 2.

Task:

Determine the load factor of the oven in the production of loaves in the case of its fulfillment of the daily order for the production of only one product. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;
- the company operates in three shifts, the duration of one shift is 8 hours.
- technological norm of oven productivity is 2.9 tons of loaves per shift;
- time of regulated breaks during the shift is 20 minutes;
- baking time of the loaf is 31 minutes;
- the number of pipes in the oven is 24 pcs.;
- planned yield of loaves from one ton of flour is 134.6%;
- flour is delivered in bags. Weight of one bag is 70 kg;
- technological productivity of the flour-sifting unit is 2,5 tons in change;
- weight of flour in one bowl is 120 kg;
- technological productivity of the dough divider is 6100 dough blanks;
- rate of waste in the dough division is 4%;
- weight of one dough blank is 0.5 kg.

Task 3.

Task:

Determine the rhythm of loading and unloading of the oven in the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;
- the company operates in three shifts, the duration of one shift is 8 hours.
- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;
- time of regulated breaks during the shift is 20 minutes;
- baking time of the loaf is 31 minutes;
- the number of pipes in the oven is 24 pcs.;
- planned yield of loaves from one ton of flour is 134.6%;
- flour is delivered in bags. Weight of one bag is 70 kg;
- technological productivity of the flour-sifting unit is 2,5 tons in change;
- weight of flour in one bowl is 120 kg;
- technological productivity of the dough divider is 6100 dough blanks;
- rate of waste in the dough division is 4%;
- weight of one dough blank is 0.5 kg.

The rhythm of loading and unloading of the oven is determined by dividing the duration of circulation by the number of pipes in the baking chamber.

Task 4.

Task:

Determine the production task of the sifting department in the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;

- the company operates in three shifts, the duration of one shift is 8 hours.

- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;

- time of regulated breaks during the shift is 20 minutes;

- baking time of the loaf is 31 minutes;

- the number of pipes in the oven is 24 pcs .;

- planned yield of loaves from one ton of flour is 134.6%;

- flour is delivered in bags. Weight of one bag is 70 kg;

- technological productivity of the flour-sifting unit is 2,5 tons in change;

- weight of flour in one bowl is 120 kg;

- technological productivity of the dough divider is 6100 dough blanks;

- rate of waste in the dough division is 4%;

- weight of one dough blank is 0.5 kg.

The production task of the flour sifting department (Fb) is determined by the amount of flour that must be sifted in a certain period of time and fed to the kneading department taking into account the output of finished products from a ton of flour: $Fb = P \cdot 100 / R$,

where P is a variable planned task type of products; R - the planned yield of products from a ton of raw materials, %.

Task 5.

Task:

Determine the load factor of the flour sifting unit in the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;
- the company operates in three shifts, the duration of one shift is 8 hours.
- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;
- time of regulated breaks during the shift is 20 minutes;
- baking time of the loaf is 31 minutes;
- the number of pipes in the oven is 24 pcs .;
- planned yield of loaves from one ton of flour is 134.6%;
- flour is delivered in bags. Weight of one bag is 70 kg;
- technological productivity of the flour-sifting unit is 2,5 tons in change;
- weight of flour in one bowl is 120 kg;
- technological productivity of the dough divider is 6100 dough blanks;
- rate of waste in the dough division is 4%;
- weight of one dough blank is 0.5 kg.

The load factor of the flour sifting unit can be calculated by the formula:

Fb = P · 100 / R, where P is a variable planned task type of products; R - the planned yield of products from a ton of raw materials, %.

Task 6.

Task:

Determine the rhythm of flour supply per 1 ton in the absence of silos for storage of sifted flour in the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;
- the company operates in three shifts, the duration of one shift is 8 hours.
- technological norm of furnace productivity is 2.9 tons of loaves per shift;
- time of regulated breaks during the shift is 20 minutes;
- baking time of the loaf is 31 minutes;
- the number of pipes in the oven is 24 pcs.;
- planned yield of loaves from one ton of flour is 134.6%;
- flour is delivered in bags. Weight of one bag is 70 kg;
- technological productivity of the flour-sifting unit is 2,5 tons in change;
- weight of flour in one bowl is 120 kg;

- technological productivity of the dough divider is 6100 dough blanks;

- rate of waste in the dough division is 4%;

- weight of one dough blank is 0.5 kg.

In the presence of silos for storage of sifted flour, the rhythm of flour supply per 1 ton is calculated: (480 - 20) / Fb, where the production task of the sifting department (Fb) is calculated by the formula: Fb = P · 100 / R, where P is a variable planned task type of products; R - the planned yield of products from a ton of raw materials, %.

Task 7.

Task:

Determine the production task as for the number of bags of flour consumed per shift when feeding flour in bags to the kneading department for the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;

- the company operates in three shifts, the duration of one shift is 8 hours.

- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;

- time of regulated breaks during the shift is 20 minutes;

- baking time of the loaf is 31 minutes;

- the number of pipes in the oven is 24 pcs .;

- planned yield of loaves from one ton of flour is 134.6%;

- flour is delivered in bags. Weight of one bag is 70 kg;

- technological productivity of the flour-sifting unit is 2,5 tons in change;

- weight of flour in one bowl is 120 kg;

- technological productivity of the dough divider is 6100 dough blanks;

- rate of waste in the dough division is 4%;

- weight of one dough blank is 0.5 kg.

In the presence of silos for storage of sifted flour, the rhythm of flour supply per 1 ton is calculated: (480 - 20) / Fb, where the production task of the sifting department (Fb) is calculated by the formula: $Fb = P \cdot 100 / R$, where P is a variable planned task type of products; R - the planned yield of products from a ton of raw materials, %.

Task 8.

Task:

Determine the production task of the kneading department (the number of dough bowls that are necessary for the smooth operation of the oven) in the proportional preparation of the dough in the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;

- the company operates in three shifts, the duration of one shift is 8 hours.

- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;

- time of regulated breaks during the shift is 20 minutes;

- baking time of the loaf is 31 minutes;

- the number of pipes in the oven is 24 pcs.;

- planned yield of loaves from one ton of flour is 134.6%;

- flour is delivered in bags. Weight of one bag is 70 kg;

- technological productivity of the flour-sifting unit is 2,5 tons in change;

- weight of flour in one bowl is 120 kg;

- technological productivity of the dough divider is 6100 dough blanks;

- rate of waste in the dough division is 4%;

- weight of one dough blank is 0.5 kg.

In the batch method of dough preparation, the number of dough bowls that are necessary for the uninterrupted operation of the oven is calculated: $Fb = P \cdot 100 / q \cdot R$, where P is the technological norm of oven productivity; q is the mass of flour in one bowl, tonns.; R - the planned output of loaves of one ton of flour.

Task 9.

Task:

Determine the rhythm of kneading the dough in proportion to the preparation of the dough in the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;

- the company operates in three shifts, the duration of one shift is 8 hours.

- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;

- time of regulated breaks during the shift is 20 minutes;

- baking time of the loaf is 31 minutes;

- the number of pipes in the oven is 24 pcs .;

- planned yield of loaves from one ton of flour is 134.6%;

- flour is delivered in bags. Weight of one bag is 70 kg;

- technological productivity of the flour-sifting unit is 2,5 tons in change;

- weight of flour in one bowl is 120 kg;

- technological productivity of the dough divider - 6100 dough blanks;

- rate of waste in the dough division is 4%;

- weight of one dough blank is 0.5 kg.

The rhythm of dough kneading is (480 - 20) / Fb, where the number of dough bowls that are necessary for the smooth operation of the oven: Fb = P · 100 / q · B, P - technological rate of oven performance; q is the mass of flour in one bowl, tons.; B - the planned output of loaves of one ton of flour.

Task 10.

Task:

Determine the production task of the dough division, taking into account the loss of a certain number of pieces of dough as a result of their processing in the production of loaves. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;
- the company operates in three shifts, the duration of one shift is 8 hours.
- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;
- time of regulated breaks during the shift is 20 minutes;
- baking time of the loaf is 31 minutes;
- the number of pipes in the oven is 24 pcs .;
- planned yield of loaves from one ton of flour is 134.6%;
- flour is delivered in bags. Weight of one bag is 70 kg;
- technological productivity of the flour-sifting unit is 2,5 tons in change;
- weight of flour in one bowl is 120 kg;
- technological productivity of the dough divider is 6100 dough blanks;
- rate of waste in the dough division is 4%;
- weight of one dough blank is 0.5 kg.

The production task of the dough division (Pt) is set taking into account the loss of a certain number of pieces of dough as a result of their processing. If the rate of waste in this department is 4%, and the

weight of one dough piece is 0.5 kg, the production task of the dough division (Pt) will be: Pt = Tn * Nw / Mb, where Tn is the technological norm of furnace productivity; Nw - rate of waste in the dough separation department; Mb is the mass of one dough blank.

Task 11.

Task:

Determine the rhythm of the dough divider in the production of loaves. Initial parameters of the line for baking loaves are:

- daily production of loaves of wheat flour is 8.7 tons;
- the company operates in three shifts, the duration of one shift is 8 hours.
- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;
- time of regulated breaks during the shift is 20 minutes;
- baking time of the loaf is 31 minutes;
- the number of pipes in the oven is 24 pcs.;
- planned yield of loaves from one ton of flour is 134.6%;
- flour is delivered in bags. Weight of one bag is 70 kg;
- technological productivity of the flour-sifting unit is 2,5 tons in change;
- weight of flour in one bowl is 120 kg;
- technological productivity of the dough divider is 6100 dough blanks;

- rate of waste in the dough division is 4%;

- weight of one dough blank is 0.5 kg.

The rhythm of the dough divider is: (480 - 20) / Pt, where the production task of the dough divider: Pt = Tn * Nw / Mb, where Tn is the technological norm of furnace productivity; Nw - rate of waste in the dough separation department; Mb is the mass of one dough blank.

Task 12.

Task:

Determine the utilization rate of the dough divider in the production of loaves at its technical and economic rate of productivity of 6100 dough pieces per shift. Initial parameters of the line for baking loaves:

- daily production of loaves of wheat flour is 8.7 tons;

- the company operates in three shifts, the duration of one shift is 8 hours.

- technological rate of productivity of the furnace is 2.9 tons of loaves per shift;

- time of regulated breaks during the shift is 20 minutes;

- baking time of the loaf is 31 minutes;

- the number of pipes in the oven is 24 pcs.;

- planned yield of loaves from one ton of flour is 134.6%;

- flour is delivered in bags. Weight of one bag is 70 kg;

- technological productivity of the flour-sifting unit is 2,5 tons in change;

- weight of flour in one bowl is 120 kg;

- technological productivity of the dough divider is 6100 dough blanks;

- rate of waste in the dough division is 4%;

- weight of one dough blank is 0.5 kg.

Index of use of the dough divider machine at its technical and economic norm of productivity of 6100 dough blanks per shift: K = Pt / 6100 = 0.98, where the production task of the dough division: Pt = Tn * Nw / Mb, where Tn is the technological norm of furnace productivity; Nw - rate of waste in the dough separation department; Mb is the mass of one dough blank.

Task 13.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed among production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95

Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough, it is 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Using the rate of yield of loaves per ton of flour, determine the reduced productivity of the sifter in the production of loaves.

The productivity of the equipment must be reduced to comparable units: either in the unit of raw materials (flour), or units of finished products (tons of finished products).

In this task, according to the data the productivity of the equipment is given in units of technical standards of productivity: tons of sifted flour - sifter; tons of dough - kneading machine; dough blanks - dough divider; tons of finished products - furnace.

To ensure the comparability of equipment performance data, it is necessary to bring it to a single measurement standard - tons of finished products.

Using the rate of yield of loaves per ton of flour, determine the reduced productivity of the sifter. The conversion factor of flour into finished products will be: *Fc = L / 100*, where *L* is the yield of loaves.

Task 14.

Task:

The production line produces loaves cut 1 grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Using the rate of yield of loaves per ton of flour, determine the reduced productivity reduced productivity of the sifter on the finished product (loaves).

The productivity of the equipment must be reduced to comparable units: either in the unit of raw materials (flour), or units of finished products (tons of finished products).

In this problem, according to the data, the productivity of the equipment is given in units of technical standards of productivity: tons of sifted flour - sifter; tons of dough - kneading machine; dough blanks - dough divider; tons of finished products - furnace.

To ensure the comparability of equipment performance data, it is necessary to bring it to a single measurement standard - tons of finished products.

The productivity of a sifter on finished products (loaves) will be equal P=Tn*Fc (*Fc = L / 100,* where *L* is the yield of loaves).

Task 15.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the reduced performance of the dough mixer, expressed in the mass of the finished product.

Task 16.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of the dough fermentation trough, expressed in the mass of finished products.

Task 17.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of the dough divider, expressed in the mass of finished products.

Task 18.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the reduced productivity of the endurance expressed in the mass of finished products.

Task 19.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of the furnace expressed in the mass of finished products.

Task 20.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the rhythm of the production line for the workplace.

Task 21.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of processing a unit of the object of labor for sifting flour under the same productivity of the production line and all jobs.

Task 22.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of processing a unit of the object of labor for kneading the dough under the same productivity of the production line and of all working places.

Task 23.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of processing a unit of the object of labor for the fermentation of the dough under the same productivity of the production line and all jobs.

Task 23.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of processing a unit of the subject of labor for the formation of dough blanks under the condition of the same productivity of the production line and of all working places.

Task 24.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of processing a unit of the subject of labor for the formation of dough blanks under the condition of the same productivity of the production line and of all working places.

Task 25.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of processing a unit of the object of labor to stand the dough blank, provided the same productivity of the production line and of all working places.

Task 26.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the productivity of processing a unit of the object of labor for baking loaves, provided the same productivity of the production line and of all working places.

Task 27.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	Equipment	Technical norms of productivity
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Comparison of the duration of processing of objects of labor and rhythm gives an idea of the level of loading of individual equipment (El) for operations of the technological cycle: El = P / r, where P - productivity of processing a unit of the object of labor; r is the rhythm of the production line.

Task 28.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the load level of the dough mixer.

Comparison of the duration of processing of objects of labor and rhythm gives an idea of the level of loading of individual equipment (El) for operations of the technological cycle: El = P / r, where P - productivity of processing a unit of the object of labor; r is the rhythm of the production line.

Task 29.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the load level of the fermentation trough.

Comparison of the duration of processing of objects of labor and rhythm gives an idea of the level of loading of individual equipment (El) for operations of the technological cycle: El = P / r, where P - productivity of processing a unit of the object of labor; r is the rhythm of the production line.

Task 30.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the load level of the dough divider.

Comparison of the duration of processing of objects of labor and rhythm gives an idea of the level of loading of individual equipment (El) for operations of the technological cycle: El = P / r, where P -

productivity of processing a unit of the object of labor; r is the rhythm of the production line.

Task 31.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;
- during baking - 8.7%.

Determine the load level of the enduring cabinet.

Comparison of the duration of processing of objects of labor and rhythm gives an idea of the level of loading of individual equipment (El) for operations of the technological cycle: El = P / r, where P - productivity of processing a unit of the object of labor; r is the rhythm of the production line.

Task 32.

Task:

The production line produces loaves of the 1st grade and consists of the equipment which is distributed on production operations:

CHARACTERISTICS OF EQUIPMENT OF THE LINE

Operation	**Equipment**	**Technical norms of productivity**
Sifting flour	sifter	0,70
Kneading the dough	kneading machine	0,95
Fermentation of the dough	trough for fermentation	1,03
Dough processing (division)	dough divider	1,60
Baking the dough	maturing cabinet	1,05
Baking bread	oven	0,83

The yield of loaves is 139.9%, the rate of technological costs:

- during fermentation 1.7%;
- when processing the dough - 0.1;
- at endurance - 1,2%;

- during baking - 8.7%.

Determine the load level of the bread oven.

Comparison of the duration of processing of objects of labor and rhythm gives an idea of the level of loading of individual equipment (El) for operations of the technological cycle: El = P / r, where P - productivity of processing a unit of the object of labor; r is the rhythm of the production line.

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