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Assessment of Factors Affecting the Nature and Characteristics of the Production Structure of an Industrial Enterprise

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ABSTRACT
The article describes the production structure of an industrial enterprise and its structural units. The production structure of an enterprise is analyzed in the context of specialization and production scale. The key factors affecting the organization of the production structure are identified.

Keywords: industrial production; enterprise structure; production specialization; scientific and technological progress; auxiliary production; workshop

INTRODUCTION

Successful production activities require a rational organization of the production process, which is based on the most efficient production structure.

The production structure of an enterprise is a set of production units that make up the enterprise, and the forms of linkages between them. The production structure depends on the type of products manufactured by the enterprise and its nomenclature, the type of production and forms of its specialization, and on the specific characteristics of technological processes.

The production structure of an industrial enterprise includes the following units: production units, workshops, sections, service facilities set up on the basis of special principles of construction, interconnection and location. The main principle of the formation of the production structure of an enterprise is the division of labor between its individual elements, which manifests itself in in-plant specialization and production cooperation.

There are the following types of production structures:

(1) A complex (multi-stage) production structure including all stages of the production process: preparation, processing and manufacturing.

(2) Specialized (one-stage or two-stage) production structure excluding one or two stages of the production process, the process being carried out in the form of cooperative deliveries from other enterprises.

The primary element of the production structure is a workplace, which is part of the production area of the workshop, equipped with basic machinery and auxiliary devices, subjects of labor, serviced by one or more workers.

It should be noted that each production process is carried out in appropriately equipped workplaces, which form a production section where technological processes for the manufacture of finished products or semi-finished products are implemented.

An industrial enterprise generally has a shop structure, which is subdivided into main and auxiliary production, service and subsidiary facilities.

In accordance with the division of the production process into main, auxiliary and service processes, any industrial enterprise has main, auxiliary, subsidiary shops and service facilities. It is their composition and forms of production linkages that are commonly called the production structure.

A workshop acts as a standalone organizational unit of the enterprise, consisting of production and auxiliary sections and service units. It is the main structural unit of the enterprise performing certain production functions determined by the nature of cooperation within the enterprise itself. But it should be noted that some of the small- and medium-sized enterprises do not have a shop structure and are divided into production areas.

Depending on the type of specialization, a production structure can be technological, subject-specialized or mixed-type. Thus, a technological shop specializes in homogeneous production processes (foundry, assembly, etc.), a subject-specialized shop turns out finished products, while a mixed-type shop carries out preparation processes.

The most important factors that shape the production structure of an industrial enterprise are:

- industry classification of the enterprise;
- characteristic features of technological processes;

- level of specialization and production cooperation;
- volume of production output.

It should be noted that an efficient production structure of an enterprise, i.e., the choice of the correct ratio between the main and auxiliary production, service, subsidiary and other structural units, largely determines the efficiency of its operation. This is due to the fact that the process of manufacturing the end product takes place in its main production shops, which should be dominant not only in terms of their role in the operation of the enterprise, but also in terms of the number of employees, cost of basic production assets and the production areas they occupy.

Aside from the above units that form the production structure of the enterprise, it also includes non-production structural units that form its infrastructure. They are not involved in the production process, i.e., in the processing of any subjects of labor into a finished product. The main purpose of such units is to provide production with the necessary material and energy resources, to organize and implement the processes of selling finished products. Consequently, infrastructure units of an enterprise are outside the production stage, but they function in the field of exchange, i.e., they fulfill mainly supply and marketing functions. The main objective of logistics services is the timely, complete and uninterrupted supply of the enterprise with all types of raw materials and fuel and energy resources required for production.

One of the main structural units of the infrastructure of an industrial enterprise is the finished product sales service. This structural unit may include the wholesale and retail trade outlets, brand stores and emporiums in order to increase the efficiency of the sales process.

To ensure the effective operation of such infrastructural units as logistics service and finished product sales service, they also include service facilities: storage warehouse and transportation facilities.

Production structures of enterprises are very diverse. However, there is the following set of factors that affect the nature and characteristics of a particular structure.

INDUSTRY CLASSIFICATION OF THE ENTERPRISE

It is determined by the nature of the production process, design specifics and the purpose of the end product. This factor first and foremost affects the composition of the main workshops of the enterprise, which will differ significantly in different industries. Thus, a one-stage production structure is typical for extractive industries, while a multi-stage structure is common for manufacturing industries.

For instance, in the machine-building industry, the main production shops include foundry, forge and press, machining and assembly shops.

Auxiliary workshops will (taking into account certain specific features) be identical in all industries, therefore, the industry classification of the enterprise has almost no effect on their composition and organizational features.

THE NATURE OF THE PRODUCTION PROCESS (ANALYTICL, SYNTHETIC, DIRECT) AFFECTS THE LEVEL OF DEVELOPMENT AND THE DIVERSITY OF THE MAIN STAGES OF THE PRODUCTION PROCESS AT THE ENTERPRISE

preparation, processing and manufacturing.

In an analytical production process, when several types of finished products can be produced from one type of raw material, enterprises may have one or two preparation shops and several manufacturing shops. In this case, the problem of organizing the sale of products of various nature becomes relevant. This structure is typical for enterprises of the chemical, metallurgical, light and food industries.

The use of a synthetic production process at an enterprise, on the contrary, implies setting up several preparation shops and a limited number of manufacturing shops. This type of production structure is typical for machine-building enterprises, as well as furniture factories. For instance, an automobile plant has foundries, forge and press shops and assembly lines for assembling several models of cars. For the production structure of these enterprises, the issue of organizing logistical support and the delivery of a large range of material resources and purchased semi-finished materials becomes very relevant.

The direct manufacturing process is used in extractive industries: mines, quarries. Their production structure may include one or two preparation shops (extraction and beneficiation of raw materials) and one manufacturing shop for small-scale processing of raw materials and sending them to consumers.

DESIGN AND TECHNOLOGICAL CHARACTERISTICS OF PRODUCTS

Product quality specification have a significant impact on the nature of the production structure of the enterprise. For instance, in the manufacture of science-intensive, high-precision equipment (radio electronics, electrical engineering, machine tool building, aviation industry), the percentage of employees of the units servicing the pre-production stage is substantial. These are mainly scientific and technical centers, laboratories, experimental workshops, test stations, units of installation supervision, set-up and maintenance of their products at consumers. The linkages at these enterprises are quite complex. Their production structure has to be highly flexible and adaptable. This is due primarily to the high rates of product update and constant development of new types of products.

PRODUCTION SCALE

The size of the enterprise has a significant impact on the composition and size of its production structures. The larger the enterprise, the more complex and expensive its production structure, the more diverse the composition of its elements: sections, workshops, production units, as Table 1 shows.

TABLE 1: Composition of production structures at small-, medium-sized and large machine-building enterprises

Name of unit	Enterprise size		
	Small	Medium	Large
Production unit	-	-	+
Workshop	-	+	+
Section	+	+	+
Workplace	+	+	+

Source: The table is prepared by the author

As can be seen from Table 1, large enterprises with a 4-level production structure are the most complex. A production unit is a medium-sized enterprise consisting of several specialized workshops, which, in turn, are made up of sections and workplaces.

SCIENTIFIC AND TECHNICAL PROGRESS

Scientific and technological progress has a dual impact on the production structure of an enterprise.

On the one hand, the growing complexity of the manufactured products and high-quality standards make the production structure of an enterprise more complex. It includes units engaged in the scientific and technical preparation of production: laboratories, experimental workshops specializing in the development of new types of products. Scientific and technological progress also determines the obsolescence of the products and equipment used, which imposes additional requirements on the production structure in terms of its flexibility, adaptability, thereby significantly expanding the boundaries of work on its restructuring. On the other hand, the introduction of the achievements of scientific and technological progress leads to a simplification of the production structure. For instance, the introduction of precision casting methods significantly reduces labor costs for subsequent machining of parts and simplifies the production structure of machining shops. Integration of production processes based on the use of numerically controlled machine tools, modular multi-station machines and production lines leaves sections with traditional-type equipment out of workshops, simplifying their structure.

Currently, the production structure and the complexity of intra-production linkages between shops are affected by the volume of production output, and the larger the shops of the enterprise, the worse the specialization. In large industrial enterprises, several shops can be set up within each stage of production.

Specialization in industrial enterprises, especially in the machine-building industry means first and foremost the production of one-type products based on the use of advanced equipment, technological processes that meet modern standards, and their concentration in one enterprise.

From an economic point of view, specialization is effective and opens up the possibility for mass production. It is in mass production that advanced manufacturing methods and high-performance equipment are used, its primary affect being the growth of workforce productivity and the decrease in the production costs at industrial enterprises, including machine-building ones.

Therefore, the efficiency of production specialization is characterized by the savings resulting from its implementation at the enterprise.

Thus, the nature of the production structure is determined by the specific characteristics of the enterprise itself, its industry classification, size, degree of specialization and production cooperation. When designing a production structure, all these features should be taken into account.

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