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FEATURES OF THE FORMATION OF EFFECTIVE TECHNOLOGICAL PROCESSES FOR THE PRODUCTION OF PRIORITY AND DEMANDED PRODUCTS BY CONSUMERS IN THE REGIONS OF THE SOUTHERN FEDERAL DISTRICT AND THE NORTH CAUCASUS FEDERAL DISTRICT

Abstract: *in the article the authors have developed software that allows you to track the flow of funds from the result of marketing policy in order to guarantee the enterprise a warning from bankruptcy. The collective monograph provides examples of calculating the main technical and economic indicators that allow enterprise managers to make the only right decisions that create economic stability for them. Of particular interest are the results of the authors' studies, due to the care of children, so that the shoes they use, purchased outside specially provided stores, would not be dangerous for them, forming pathological abnormalities of the foot in them due to the shoe's non-compliance with the requirements of technical regulations. Unfortunately, the number of children with acquired pathological changes in the foot is increasing.*

Key words: *quality, import substitution, demand, competitiveness, market, profit, demand, buyer, manufacturer, financial stability, sustainable TPP, attractiveness, assortment, assortment policy, demand, sales. paradigm, economic policy, economic analysis, team, success.*

Language: *English*

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Introduction

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The need for a flexible organization of the production system is explained by economic and organizational laws. The relationship between the producer and the consumer determines the economic law of mutual benefit. Organizational laws determine the requirements for adapting the production system to an open economy, which, in turn, is adjusted by the law of ensuring the adequacy of the internal structure and possible types of organization of footwear

production to the conditions of the external market environment. By expanding the assortment and ensuring high quality of manufactured goods, enterprises gain new sales markets and maintain their positions in an already conquered market. The idea of working for an individual consumer allows enterprises to fulfill additional orders without changing the main production plan even in conditions of large-scale production.

Flexibility is the dominant concept in the literature on the most progressive trends in the development of modern industry. Therefore, it is necessary to clearly define this concept based on the analysis of modern systemic concepts. It should be noted that the main research related to the flexible production system was carried out for the conditions of mechanical engineering, due to the widespread use of numerically controlled machines in this industry, including machining centers, industrial robots and other computer-controlled equipment, which is not typical for light industry.

A large number of publications and authors dealing with the problem of production flexibility predetermines different approaches to the content of this concept. So, V.F. Gornev understands flexibility as the possibility of a sufficiently fast and economical change in the structural elements of the production system, parameter arrangements, algorithms and operating programs. At the same time, the flexibility of the production system is determined by the range of changes in the technical characteristics and elements of the production system; versatility of technical solutions for main and auxiliary equipment; the time required to change the technical characteristics; improving the management system. The author compares the concept of flexibility with the concept of adaptability of production processes.

M.Kh. Bleherman refers to flexibility as the ability of a production system to adapt to changing operating conditions with minimal cost and no loss or very little loss of productivity.

The concept of flexibility according to D.A. Nysu reflects the ability of the system to maintain certain production parameters (productivity, accuracy, economic efficiency) within specified limits under non-stationary operating conditions and compensate for various external influences by changing internal parameters according to appropriate criteria in space and time.

Yu.M. Solomentsev proposes to consider the flexibility of automated machine tool systems (ACC) as their ability to adapt to a change in the nomenclature of parts and various production situations. In this case, adaptation is understood as the transition of the ACC from an inoperative state to a working one, and by a production situation - organizational features associated, for example, with equipment and tool failures, with the launch of extraordinary parts for processing, etc.

V.N. Samochkin defines the flexibility of an enterprise as "the ability to obtain the desired result, which allows it to master, within a certain period of time, a regular number of products that can be demanded by the market and, in turn, allow it to obtain the necessary result in the future, ensuring the survival and development of the enterprise" ...

P. Blyton considers the concept of flexibility by J. Atkinson only as the flexibility of the workforce, including functional in terms of number, time and financial flexibility.

Thus, flexibility is a system characteristic reflecting the ability of any system to adapt to the dynamics of internal and external influences, maintaining the performance indicators at the required level of efficiency. The main principles, the implementation of which allows you to achieve an appropriate level of flexibility, are modularity, variance, consistency, information content.

Flexible technology - the ability to structural changes, quick adaptation of production elements in conditions of dynamism and intensification.

The concept of flexibility reflects the ability of a system to maintain certain parameters (productivity, economic efficiency) within specified limits under non-stationary operating conditions. It also compensates for various external influences by changing internal parameters according to appropriate criteria in space and time.

There are other interpretations with a significant range of understanding of flexibility from readjustment to full automation. Even a cursory analysis of the views reflected in the literature on the concept of flexibility of the production system indicates that it has not yet been finally formulated. To a greater extent, it is revealed in the definition proposed by B.V. Prykin, who considers flexibility as the ability of a system to perceive innovations and adapt to new conditions of functioning in the event of deviations from its existing state without violating its integrity. Based on the study of all available views on the problem of the flexibility of the production system, the concept of the flexibility of the production system is formulated as follows: “The concept of flexibility is to create such a production system,

Main part

The integration processes taking place in the world economy are influenced by two main directions that have developed in the new technological paradigm: an orientation towards increasing productivity and competitiveness. Structural restructuring of the economy at the end of the XX century. was carried out under the influence of the spread of new information technologies, increased uncertainty of functioning and the development of new models of management and marketing.

The mass production model was based on increasing labor productivity through economies of

scale in a conveyor mechanized process of manufacturing standardized products, subject to the control of a vast market by a specific organization - a large corporation built on the principle of vertical integration and an institutionalized, social and technical division of labor. These principles were embedded in management methods called "Taylorism" and "scientific organization of labor."

When demand became unpredictable in terms of quantity and quality, world markets diversified and as a result became difficult to control, and the pace of technological change made highly specialized production equipment obsolete, the mass production system became too rigid and expensive for the new economy. The provisional response to this rigidity was a flexible manufacturing system. It was practiced and conceptualized in two different forms: as a flexible specialization, as formulated by Piore and Sabel, based on the experience of the industrial regions of Northern Italy, where "production adapts to incessant changes without pretending to control them" in the structure of industrial crafts or custom production.

At the same time, the concept of flexible specialization is based on the methods of implementing the “flexible production paradigm” as the most adequate response to market changes.

However, the practice of industrial management in recent years has introduced another form of flexibility: dynamic flexibility, as defined by Corea, or flexible manufacturing with high volume output, as defined by Cohen and Zisman, also adopted by Bayren, characterizing the transformation of the insurance business. Flexible, high-volume manufacturing systems, typically associated with growing demand for a given product, combine high production volumes for economies of scale, with customized, easily reprogrammable production systems that allow economies of scale. New technologies make it possible to rebuild assembly lines typical of a large enterprise into a set of easily programmable production units,

In industrialized countries, large-scale and mass production is only 20%, and single, small-scale and batch production is 80%.

For many decades, the most efficient technological systems, in terms of flexibility, were automated lines built on the basis of an aggregate principle from standardized parts in a mass production environment. These lines are designed taking into account a specific technology, volume and cycle of production, capabilities and production areas of the customer, etc. The technical revolution in all areas of technology has led to frequent product changes. The trend towards diversification has manifested itself in the creation of various models of all types and types of shoes, adapted to the specific requirements of the consumer. The rapid renewal of the range of shoes and the decrease in serial production as a result of the appearance of modifications (individualization of consumer demand) led to the fact that that traditional rigid automated lines in many cases ceased to meet the requirements of modern technological development, and their use hinders the production of new models of footwear. In order to resolve the contradictions caused, on the one hand, by the small serial production of production facilities, and, on the other hand, by the large scale of production itself, methods of group technology were developed. These goals are achieved by creating technological systems for processing shoe parts and assemblies, which are complex complexes with a high flexibility and level of automation. All technical means in the complexes are controlled by computer controllers of different levels from control devices for individual elements to an automated production control system (ACS) and an automated process control system (ACS). From these positions, flexibility acquires the following definition: the ability of a technological system to maintain the necessary performance characteristics and parameters when the goals and objectives of the production of footwear change within the specified limits, which is achieved by changing the structure, organization and program of the system. Modern equipment for small batch production offers almost unlimited flexibility, since is a universal equipment with manual control. In these systems, the main problem was and remains not the problem of flexibility, but the problem of automating all functions while maintaining the existing flexibility. Thus, in the development of modern shoe production systems for small-scale industrial production, a different technical and organizational approach is characteristic, which ensures the achievement of high flexibility.

– division of tasks in the production cycle between specialists, autonomous groups or independent firms in such a way that each unit can maximize the "economics of scale" and expertise gained from specialization in one area, and at the same time be able to vary the final product in quantity and shape without losing overall efficiency ;

– rejection of Taylorism (reliance on skills, versatility, participation of workers in the struggle for product quality and the flow of ideas; reintegration of mental and physical work);

– decentralization of the decision-making mechanism (to reduce the alienation of workers, increase their responsibility and increase the speed of response to changing market signals);

– development of multipurpose technologies that are flexibly adaptable to various tasks and volumes;

a culture of cooperation, the development of the negotiation process between firms and within firms as a key condition that maintains the necessary interdependence and flexibility.

The problem of ensuring flexibility must be addressed not only for newly created enterprises, but

mainly for existing ones. In this case, it is divided into two components: flexibility associated with the preparation of production, and flexibility associated with the functioning of the production itself, which in turn are subdivided into the flexibility of design solutions; flexibility of the technological process; flexibility of the organizational structure; information flexibility. The formation of flexible technological processes is a reaction of production to the individualization of consumer demand, and a change in production is considered as a change in the purpose of production. In turn, changing goals requires the transition of the production system to a new state.

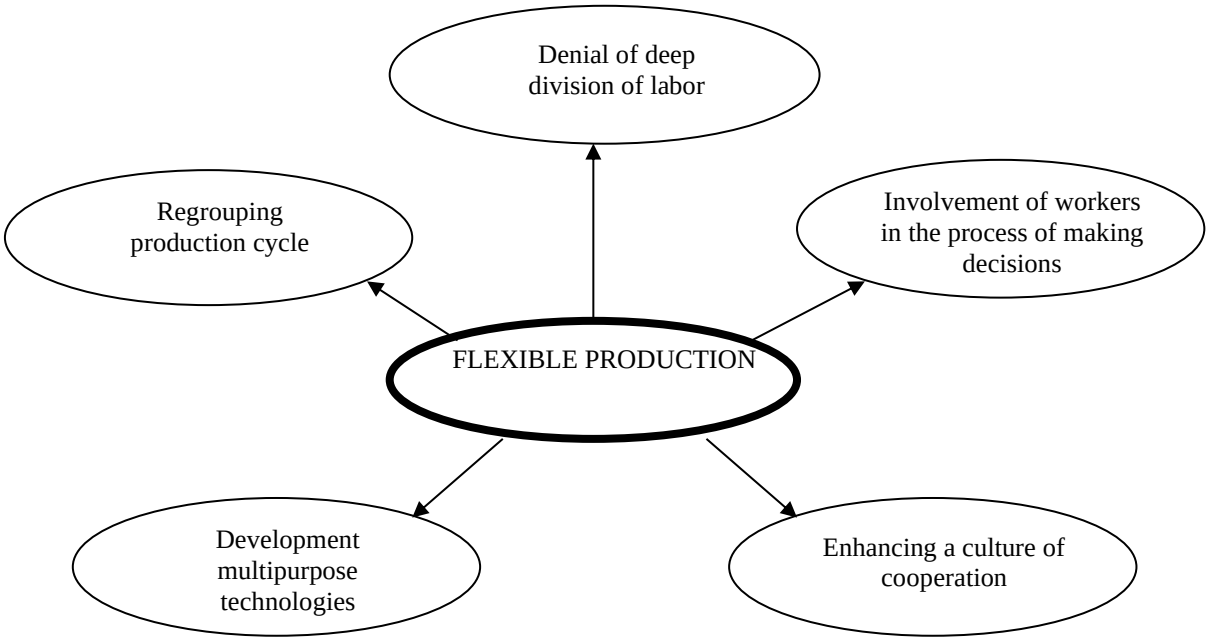


Figure 1 - Methods for ensuring production flexibility

Consider Figure 2, which characterizes the regulation of a flexible system with one degree of freedom, which is equivalent to the regulation of one parameter in a system with an arbitrary number of degrees of freedom, assuming the complete independence of this parameter from the other. In this scheme, X (t) and Y (t) are the "production goal" variable and the "input parameter" variable with the given constraints, respectively; f (t) - external disturbance; t is time.

For example, Y (t) is the current value of the unit cost, and X (t) is the current number of model names simultaneously processed in a flexible system, each of which is characterized by a vector (labor intensity; number of workers, operating and maintenance costs; cost of basic and supporting materials). Then the transfer function of the system for the goal Wc = dY / dX reflects the intensity of the change in the input characteristics of the system depending on the change in goals or, in other words, the dependence of the cost on the change in the components of the specified vector, which is described by a certain mathematical model. On the assumption that the process is continuous and the connections are linear or linearizable, the transfer function of an open-loop dynamic system can be used for frequency analysis of the stability of its given state.

The response of the system to external disturbances is characterized by the transfer function for external influences Wwn = dY / df. This function determines the stability or margin of stability of the system to external influences in a steady state. Thus, each steady state is characterized by indicators of dynamic quality: stability, stability margin, resistance to external influences.

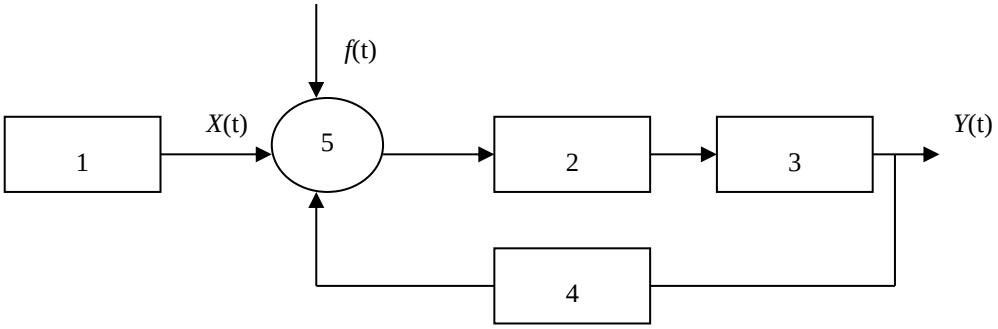


Figure 2 - Block diagram of flexible system regulation:
1 - the formation of goals and objectives of processing; 2 - generation of options for structure, organization and action program; 3 - decision making; 4 - analysis of the accepted option; 5 - analysis of deviations

Changing the purpose of production requires the transition of the system to a new state. The transient process is characterized by the time, speed and accuracy of the transition. These characteristics are dynamic indicators of the flexibility of the technological system. Unlike static ones, they characterize the limiting possible changes of a particular parameter and the number of technologically distinguishable (definable, quantized) states.

In connection with the multicriteria and multiparametric nature of steady states and transient processes in the system, the transition of the system to a new state in accordance with the set goal can be considered as its exit into the range of permissible values, and not into the optimal point of the criteria space. This is due to the fact that in a real multicriteria system, the optimal value of one of the indicators is achieved only when the other deteriorates.

Figure 3 shows a diagram of the transition of the system from state 1 to state 2 and the corresponding admissible areas ΔNS_1 and ΔNS_2adjustable parameters. It can be seen from the diagram that the transition of their state 1 to state 2 is characterized by the transition time T, the static deviation X0, the overshoot valueδ (oscillation), as well as permissible values ΔNS_1 and ΔNS_2 adjustable parameter (X2>X1). Thus, the speed of overcoming the crisis situation, which is associated with a reorientation to the production of a new range of footwear and the development of new technologies, is an indicator of the flexibility of technological and production processes.

Analysis of the dynamic transition scheme to a new state allows us to consider flexibility as a property that provides the best quality of the transition process and maintenance of the new state (Figure 3). From the presented dynamic model of the transition to a new state, two tasks can be formulated, the solution of which must be provided with the properties of flexibility. Firstly, this will improve the quality of the transient process (time, speed, accuracy), and secondly, ensure the maintenance of the new state. Obviously, the transition process is an adaptation to a new range of products, or, in other words, preparation of production for the transition to a new product. In turn, maintaining a new state is nothing more than adaptation to various production situations.

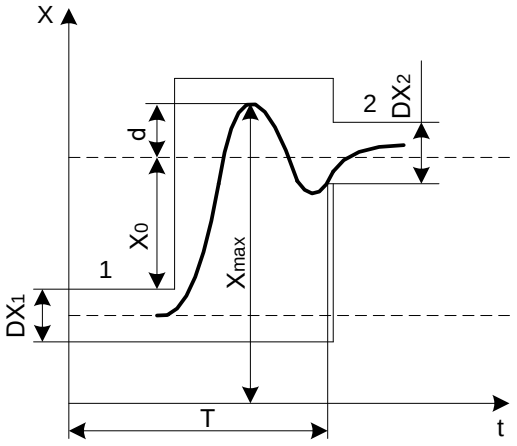


Figure 3 - Scheme of the system transition to a new state:
***T*- transition time; X0 - static deviation; Xmax - dynamic deflection; δ - the amount of overshoot; ΔNS_1 and ΔNS_2- the range of admissible values of the controlled parameter in states 1 and 2; t - current time**

Thus, flexibility allows the transition of a dynamic system of shoe production from one stable state to another in accordance with the production goal.

The greater the required deviations of the system and the higher their speed, the more complex the regulators and technical means, the higher the costs of creating and operating the system. Therefore, there is an economically rational flexibility for defining production conditions and a rational level of automation for its implementation.

In serial and large-scale production, the nomenclature of fixed models of one type of footwear is limited and the regulation system is significantly simplified; operating costs and changeover costs are split into large batches of models, resulting in an overall cost-effective production.

Consider the classification of the flexibility of the production system, taking into account the preparation and operation. YES. Nys distinguishes the following forms of flexibility: constructive, technological, parametric. (fig. 4). According to this classification, the constructive form of production flexibility is realized through the configuration of the machine transport system and the control system. Technological flexibility is provided by the following components: route, operational, software types of flexibility. It is obvious that the configuration of functional systems is determined by the adopted technological process and means of technological equipment, while the concept of constructive and technological flexibility according to D.A. Nysu can be combined into a single technological flexibility.

Parametric flexibility allows you to adjust reliability, transition time to a new state, efficiency, transition accuracy, productivity. It is fundamentally nothing more than organizational flexibility. its influence on such components as reliability, transition time, productivity is determined not only by the nature of the technological process, but also to a greater extent by organizational reasons.

Yu.M. Solomentsev et al., The flexibility of a machine tool system is taken as its transition from a non-working state to a working one and adaptation to changes in various production situations, which mean possible equipment and tool failures, the launch of extraordinary parts for processing and other organizational features. At the same time, technological, structural and organizational flexibility stand out separately. Technological flexibility should ensure the adaptation of the system to the changing nomenclature of parts. The structural flexibility of the system should allow it to fulfill its service purpose in the event of a failure of any of the components (machine tool, CNC system, tool, etc.). In addition to reliability, structural flexibility includes the ability to transfer the functions of a failed component to another.

When analyzing the presented classifications, the general characteristics of the forms of flexibility of Yu.M. Solomentsev and D.A. Nysa Technological flexibility according to Yu.M. Solomentsev is substantively identical to those identified by D.A. Lowered constructive and technological forms, united into a single technological one. Structural and organizational form of flexibility Yu.M. Solomentseva corresponds to the parametric one according to D.A. Nysu.

M.Kh. Bleherman identifies the following types of flexibility - the flexibility of expanding the system; flexibility of the nomenclature and volume of production; system adaptability; technological flexibility. The flexibility of system expansion implies the possibility of modular expansion of the production system. The flexibility of the nomenclature and the volume of production provides for the ability to update products and manufacture them with any launch batch. The adaptability of the system reflects the duration and cost of the transition to the manufacture of the next part name. Technological flexibility (route and operational) - the use of various options for the technological process to compensate for all kinds of deviations. All of these sorts of flexibility are also one technological flexibility.

V.F. Gornev distinguishes between the flexibility of the basic elements of the production system; flexibility of technological equipment; structural flexibility; flexibility of the control system. The flexibility of the basic elements of the production system is ensured by the design capabilities and technical characteristics of equipment and technical controls, their full or partial interchangeability or economically effective replacement. The flexibility of technological equipment can be considered by groups of technological equipment: separately by devices and instrumentation (Figure 4). Both of these forms of flexibility are determined by the design capabilities and technical characteristics of technological equipment: equipment and technological equipment.

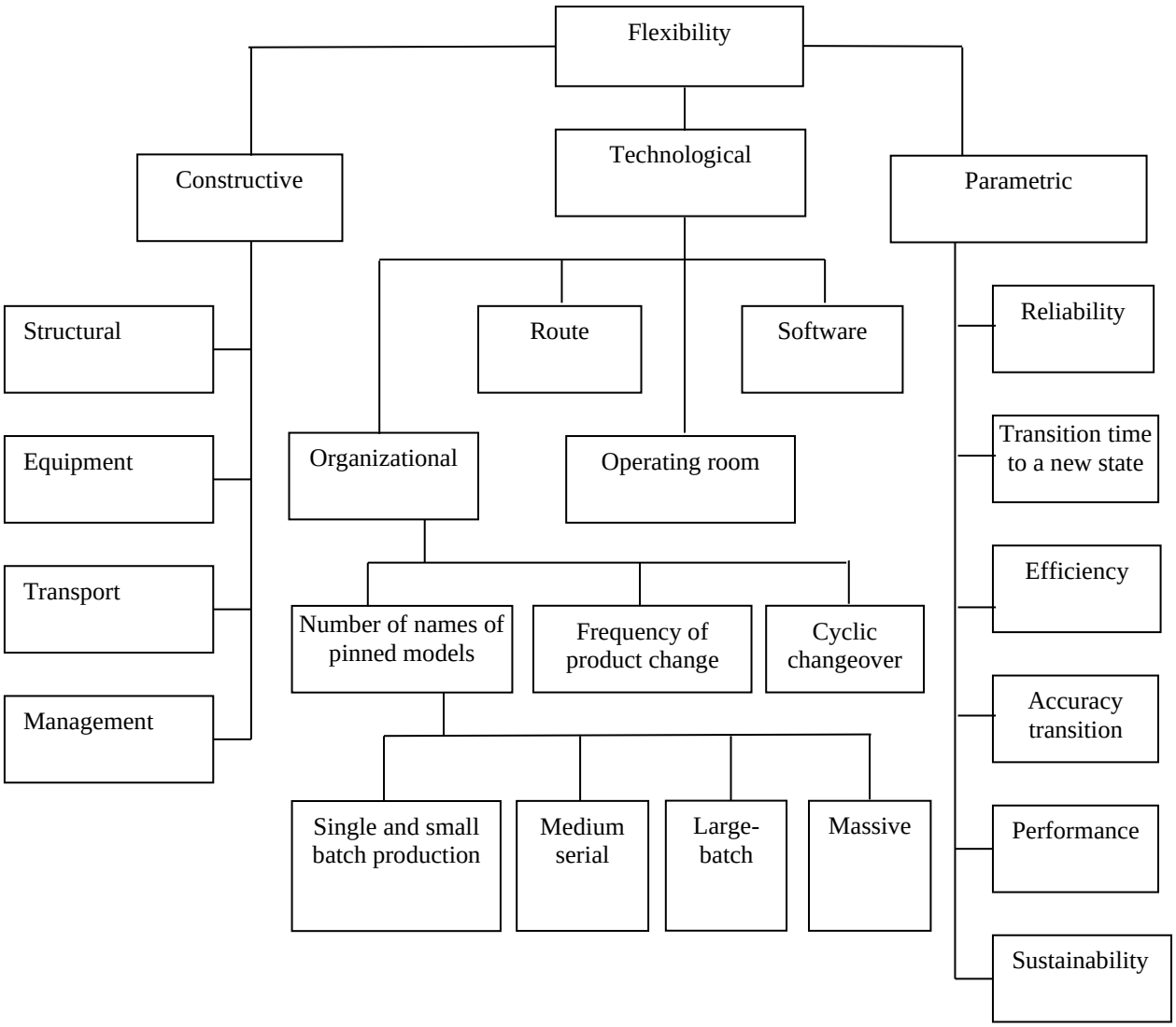


Figure 4 - Classification of forms of flexibility

Structural flexibility is determined by the possibility of implementing different variants of technological processes within the same production system in order to optimize the process when conditions change due to the appropriate structure of the system. Flexibility of the control system, in the presence of which it is possible to jointly or separately operatively change short-term production plans relative to the projected ones, intra-module and organizational control due to the presence of unplanned technological disturbances.

Both structuring and flexibility of the management system solve organizational problems, being a generalized organizational form of flexibility.

In turn, B.V. Prykin, as one of the properties of the system, introduces the concept of mobility, that is, the ability of the constituent elements of the system to move, concentrate in the necessary combinations and function rationally in specific situations, which is also a component of organizational flexibility.

On the basis of the foregoing, the structural nature of the concept of flexibility becomes obvious, it is natural that the hierarchy and content of levels in accordance with the tasks to be solved can be measured, expanded and refined. The analysis of the considered approaches makes it possible to establish that there are no fundamental differences between them.

All the proposed forms of flexibility are grouped into two main ones: technological and organizational. The diagram shown in Figure 5 reflects the influence of the reasons and tasks of production adaptation to the prevailing economic conditions and forms of flexibility that contribute to the implementation of these tasks on the flexibility of production as a whole. Thus, the creation of flexible technological processes is a complex transitional process, implemented through technological and organizational flexibility (Figure 5).

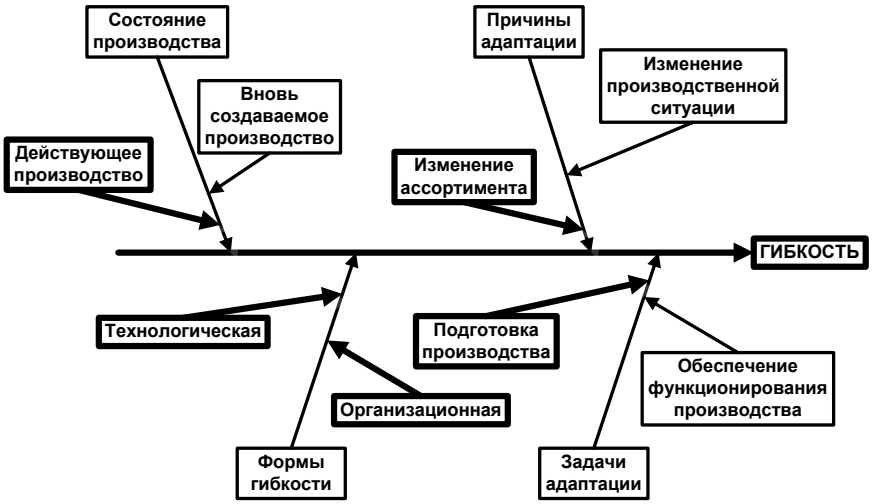


Figure 5 - Diagram of indicators affecting production flexibility

It is known that the concept of competitiveness can be applied to various objects: documentation of technology, products, production, etc. from all categories of competition: philosophical, social, psychological, market, economic, unconditional importance for production have the greatest market and economic, since they characterize its ability as a complex open organizational and economic system to predict its future, to produce specific products and to ensure due to this profit sufficient for the normal functioning and development.

The competitiveness of an enterprise is determined by external and internal factors. The factors of the organization's competitiveness, determined by the external environment, are elements that must be taken into account when forming the flexibility of a production system of any kind, however, in the future, only the influence of internal competitive advantages is considered.

Market and economic categories of the competitiveness of enterprises and the industrial products they produce have been studied in detail in the works of M. Porter, J.-J. Lamben, W.J. Stevenson and others.

So, M. Porter singles out as innovations that allow creating a competitive advantage of production or its products, new technologies, new or changed customer requests, the emergence of a new segment of the industry, changes in government regulation, changes in the cost or availability of production components. At the same time, the changed requests of buyers, the emergence of a new segment of the industry, a change in government regulation, a change in the cost of production components are classified according to the classification of J.-J. Lamben to external factors that do not affect the costs of production itself.

Buyers' actions are manifested in completely new requests or their assessments change dramatically, which serves as an impetus for the design and release of new or modified products. The emergence of a new segment of the industry allows you to enter a new group of buyers. Changes in the cost of components, changes in government regulation, are undoubtedly factors of external influence on production efficiency.

Then the changes in production components and new technologies identified by M. Porter should be considered as the reasons due to which internal factors of the enterprise's competitive advantage appear. Indeed, changing technology creates new opportunities for the development and production of goods. For an already operating production, replacing the entire technological process is an expensive measure, and the improvement of individual stages provides real opportunities for increasing the level of competitiveness of the enterprise. In any case, technology upgrades are almost always associated with additional costs.

W. J. Stevenson proposes to form the competitive advantages of an enterprise through price, quality, specific features of goods or services (production or service orientation), mobility (flexibility) of production, time or timing of processes (timing of certain operations). Among these factors, internal factors include price, quality, production flexibility, time and timing of processes. Product quality, production flexibility and the duration of processes are mainly determined by the technical and organizational level of the enterprise. At the same time, there is a clear influence of flexibility on the price of products and the duration of its production cycle. Indeed, flexibility provides a quick restructuring for the release of a new range of

products, which leads to a reduction in the duration and costs of its production.

R.A. Fatkhutdinovs are invited to take into account structural, resource, technical, managerial and market factors as internal ones.

Structural factors involved in the design of an organization include:

– production and organizational structure of the enterprise;

– the mission of the organization;

– specialization and concentration of production;

– accounting and regulation of production processes;

– informational and normative-methodological management base, etc.

Resource internal factors for achieving a competitive advantage of an organization are associated with the specifics of relationships with suppliers, taking into account and analyzing all types of resources, with a functional-cost analysis of manufactured products, optimization of the efficiency of resource use, etc.

The technical factors of the organization's competitive advantages are realized through technical innovations, including: possession of patent novelty or know-how of products and technologies, an increase in the proportion of progressive technological equipment and a decrease in its average age, etc.

Management internal factors of the organization's competitive advantage: these are the managers themselves, their level of qualifications, as well as the functioning of management systems, information support for decision-making, quality management in the organization, etc.

The increasingly fierce competition in the international consumer goods market poses new challenges for the shoe industry. This is the problem of the criticality of the time required to create a product and organize its sale, and the improvement of the quality of design and production processes, and problems associated with competition in the maintenance market, and problems associated with direct cost reduction (direct capital; wages in production and etc.).

The results of a study in the field of the state of shoe enterprises in Russia and the South and North Caucasian Federal Districts, in particular, showed their inability to cope with the growing difficulties from the external and internal environment. Having embarked on the path of transition to market relations, shoe enterprises faced a crisis in their economic systems.

The old directions in the management of a shoe factory, emerging in the internal environment (organization of production, cost reduction, efficient use of all resources, growth in labor productivity, etc.) do not provide a way out of this situation. It is necessary to develop and use new approaches in the field of economic management of the enterprise, including marketing and the development of the competitive status of the enterprise, which facilitates adaptation to the external environment.

Thus, the success of a shoe business depends on how quickly the threat to its existence is identified. This once again confirms the main conclusion based on the results of the study of the state of shoe enterprises that their adaptation to the external environment, given the absolute importance of the internal environment, should become paramount and manifest in strategic forecasting and flexible development of the enterprise.

For shoe enterprises, it is important to be able to navigate in the use of the achievements of scientific and technological progress in order to timely identify new trends, work out the concept of developing these achievements for specific production conditions, prepare for their implementation and ensure implementation.

The flexibility of the enterprise is the ability of the enterprise to obtain the necessary result, which allows it, without a radical change in the basic production assets, to master within a certain period of time a regular (necessary) number of new models of footwear that can be demanded by the market and, in turn, allow in the future period to obtain the necessary result that ensures survival and enterprise development.

The structure of footwear production is quite complex and differs in a variety of assortment of raw materials and finished products. A feature of the shoe industry is the frequent change of production facilities (assortment). The design of new models of footwear provides for the development of technological processes for their manufacture. This work should be carried out in a short time and with minimal costs, and the optimal production option is selected, since at the design stage of the technological process, the intensity of the enterprise's functioning is set in advance, i.e. the possible level of technical and economic indicators of its work. At the design stage, the foundations of product quality are also laid, since its properties largely depend not only on the appearance, functionality, fashion compliance, etc., but also on the manufacturing process.

In this regard, it would be more correct to talk about the need to create a structural model of shoe production that would ensure the functioning of a flexible technological process with the obligatory implementation of the main requirement - ensuring the manufacture of shoes in an assortment that meets the needs of the market and realizes the requirements of competitiveness.

A generalized structural diagram of the flexible development of an enterprise is shown in Figure 6.

The structural model of production will be effective even if the behavior of the proposed range of

products in its "life" is taken into account, i.e. all stages of the product life cycle (LLC) will be implemented:

– marketing and market research;
– design and development of technical requirements for the products being created;
– material and technical supply;
– preparation and development of technological processes;
– production;
– control, testing and inspection;
– packaging and storage;
– sale or distribution of products;
– installation, operation;
– technical assistance in maintenance (repair, etc.);
– disposal after the end of use of the product.

Figure 6. Generalized structural diagram of agile development shoe enterprise:
Г - mathematical dependence, providing a scheme for the development of a flexible technological process for manufacturing a range of products;
Wob - stability (result) to renewal in various cycles of development of this production;
Sob - the ability to update in different cycles of development of this production

A distinctive feature of the light industry is a short product life cycle, since the clearly defined desire of people for individuality in clothing, footwear, and accessories necessitates the production of a wide range of products. This leads to frequent product model changes, reduced batch sizes, and increased launch frequency. Organization of a lot of assortment production of products with the maximum use of the capabilities of the equipment used, labor resources and production areas and the possibility of periodic change and renewal of shoes with minimal expenditure of funds and time for organizing its production - these are the main requirements for modern production, the range of which is shown in the figures

In the general case, the average production time of a unit of TEP production is determined by the average time of performing operations T, the average value of the preparation for the launch of the corresponding batch of TK, the average time of preparation for production according to the given TPP model, the average number of batches of manufactured products during the life cycle B, the average size of the batch A. Expression for definition of TEP has the following form:

$$T_{EP} = T + TK / A + TPP / AB. \quad (1)$$

The preparation time for the launch of a batch of TK includes labor costs for the selection of materials, adjustment of equipment, planning the production of a batch of products, etc. and is calculated at a time for each batch. The production preparation time of the CCI includes: model selection, design, technological preparation, costing, pricing, production planning, which are calculated at the same time, but for the entire production program of a given model.

In the shoe industry, there is the concept of a basic model, for which the main design and technological developments are carried out, refined for working models, the so-called model features. In this regard, the concept of a conditional life cycle of the base model overlaps the life cycles of working models (Figure 7).

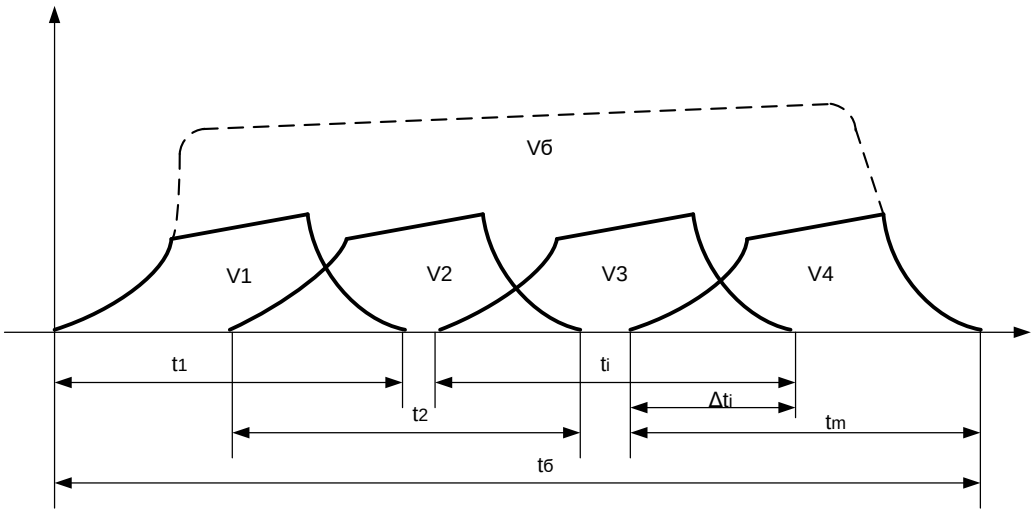


Figure 7 - Relationship of the life cycle of the base model with life cycle of working models

It is obvious that the total volume of production of products based on the basic model Vb will be determined:

$$V_б = \sum_{i=1}^{m} V_i , \quad (2)$$

where Vi is the production volume of the i-th working model;

m - the number of working models released on the basis of the base one.

In turn, you can write:

$$t_б = \sum_{i=1}^{m} t_i - \sum_{i=1}^{m} \Delta t_i , \quad (3)$$

where t_b - conditional life cycle of the base model;

t_i - life cycle of the i-th model;

Δt_i - time of alignment of life cycles of working models.

When launching n models per year based on k, the base total labor costs for the production of products will be:

$$\sum_{i=1}^{n} T_{ЕП_i} = \sum_{i=1}^{n} T_i \cdot A_i \cdot B_i + \sum_{i=1}^{n} T_{3i} \cdot B_i + \sum_{j=1}^{k} \left(T_{ППб_j} + \sum_{x=1}^{l} \Delta T_{ППр_x}\right), \quad (4)$$

where $T_{ППб_j}$ - preparation time for production of the j-th basic model;

$\Delta T_{ППр_x}$ - change in the preparation time for the production of the x-th worker models based on the j-th base;

l- the number of working models released based on the *j*-th basic.

The influence of the components of the TK and CCI on the total labor costs is determined by the level of seriality. With a small serial production, the value of total labor costs is significantly influenced by the second and third components of formula (4) for determining the average production time of a unit of TEP products. They become comparable in size to the first component, since they are one-time and are distributed over a small number of batches and products in each batch.

In this regard, the change in the average time of the main work operations performed cannot significantly affect the total labor costs. Hence, it becomes obvious that with a small serial production level of automation and specialization of equipment, it is impossible to significantly change labor costs. This is in line with the internal structure of a small business.

In mass and large-scale production, the change of models during the year is relatively small, i.e. products are produced in large batches and for a long time. Enterprises of this type mainly produce specialized footwear with practically no product variability (for military personnel, etc.). In this case, the second and third components do not have a significant effect on the total preparation time for the launch and the production preparation time is distributed over a large number of products. The determining influence on the total labor costs is the average time of operations. Based on this, the selection of equipment and the qualification of personnel should be carried out.

Realization of the concept of flexibility becomes possible with the rapid execution of various volumes of orders from small-scale, almost one-off, to orders with a large series, for example, with the level of medium series production. This entails the need not so much to reduce labor costs for preparing production and preparing the launch of batches, as in reducing the time of these preparatory work. Consequently, the technological process for the production of products should be easily reconfigurable. This implies the unconditional use of quickly adjusted and sufficiently specialized and automated equipment. The qualifications of operators and maintenance personnel must be comparatively high in order to ensure high performance for everyone in different workplaces. Flexibility should be provided for restructuring not only the technological process, but also the entire staff. In this case, all three components of the average production time of a unit of production become significant and manageable.

The characteristics of the requirements for increasing the flexibility of the functioning of production in the conditions of frequent changes in the assortment are shown in Figure 6.

Due to the large volume of products and the small number of manufactured models, the principles of flexibility when applied to mass and large-scale production are not significant. As for small-scale and individual production, it is already flexible in terms of its internal organization. Consequently, the concept of flexibility is important for medium-volume production, in which models of a wide range are produced at sufficiently large volumes.When developing an assortment of children's footwear, it is necessary to take into account the factors that shape consumer demand: compliance with the main fashion trends, economic, social and climatic specifics of the South and North Caucasian federal districts.

In terms of their natural and climatic conditions, the South and North Caucasian Federal Districts occupy a unique position in the Russian Federation. The geographical position, proximity to the three seas and varied relief with the presence of high mountains predetermine a significant diversity of the climate. In the eastern part, the continentality of the temperate climate is clearly manifested: the winter is cooler, the summer is hotter (the average temperature in July ranges from +25 to +28 ° C, in January - 4–8 ° C), the amount of precipitation is not large; The climate of humid subtropics with a large amount of precipitation prevails on the Black Sea coast; the average January temperature is + 2–5 0C.

Such mild climatic conditions in our region suggest a great demand for footwear in the spring-autumn and summer period socks (sandals, shoes, low shoes, autumn ankle boots and boots). Winter shoes are less in demand. In accordance with MGOST 26165–84 “Children's footwear. Technical conditions ”, the use of textile and artificial materials along with natural and in combination with them is the most relevant for such footwear, allows the most complete satisfaction of consumer demand for families with different income levels.

The assortment of children's shoes should focus on buyers with different income levels, for this, in the production of shoes, you can use leather of different quality: expensive, such as chevro or cheaper pigskin, shoes from which you can wear on the "exit", and when you come home, to take off, so that the child's legs are resting.

Also, when developing the assortment, it is necessary to take into account the fact that more girls are born in the Southern Federal District and the North Caucasus Federal District than boys, so shoes for girls should be produced in a larger volume than shoes for boys.

If manufacturers of footwear for children are guided by all of the above, then buyers will have the opportunity, depending on their financial situation, to give preference to products of a particular price category, made taking into account the climatic characteristics of the Southern Federal District and the

North Caucasus Federal District and the generic characteristics of their population.

One of the most important requirements of Russians for purchased footwear in general and for children in particular is its compliance with the latest fashion trends. Moreover, recently it has begun to spread not only to models for schoolchildren, but also school and toddler children. And this applies to both the products of eminent foreign brands and domestic manufacturers. Of course, there are different price niches in all the shoe markets of the world, but also a feature of our Russian: a huge sector of cheap shoes, relatively small - of average cost and very small - expensive. The second, no less important feature: a large fork between cheap shoes (up to 9 euros per pair) and expensive ones (from 200 euros per pair).

The first sector employs not only firms from South-East Asia, but also Russian wholesalers placing their orders in China. In the second, middle, there are Russian factories, as well as enterprises in Eastern Europe and Turkey that produce footwear under their own or licensed brands. In the third, there are well-known world manufacturers and even fashion houses.

At the junction - collections of European production from natural materials, adapted to the Russian market, but also of moderate cost.

Representatives of the most extensive low-cost sector, where the level of competition is very high, strive in every possible way to reduce the cost of their products through production at cheaper factories, as well as the materials used.

It should be noted that now the parents' requirements for the hygienic properties of children's shoes, namely the naturalness of the upper material, have sharply increased, because many manufacturers from the inexpensive market segment, in an effort to reduce the price, make only an insert insole and lining from genuine leather. In order for a child's foot to remain healthy, in shoes for toddlers, everything must be thought out, down to the details.

If you just think that the growth of a foot is on average completed by about 18 years of age, then you can imagine how important it is to have shoes that are suitable and healthy for your health from the outset. In the process of leg growth, a transformation occurs: since at first the child begins to crawl, then he still has crooked legs in the shape of the letter O. With the disappearance of these crooked legs, which is due to growth, crooked legs appear in the form of the letter X, when the sides of the knees are on the inside touch each other. Until about 6 years of age, a small child's leg grows, retaining the X shape. Learning to walk, the child tries to align the body vertically, and the feet are subjected to great stress. Feet and legs begin to develop as they begin to have a functional load on muscles, ligaments and tendons, begin to adapt to each other. During the period when the child begins to spontaneously get up, the foot must necessarily be able to develop freely. This also applies to further developmental stages and in older children. From a hygienic point of view, shoes should protect the body from cooling and overheating, protect the foot from mechanical damage, help muscles and ligaments to keep the arch of the foot in a normal position, provide a favorable microclimate around the foot, help maintain the required temperature and humidity conditions under any microclimatic conditions external environment. Shoes must meet hygienic requirements: be light, comfortable, do not restrict movement, match the shape and size of the foot. Then the toes are free and you can wiggle them.

Tight and short shoes make it difficult to gait, squeeze the leg, disrupt blood circulation, cause pain and, over time, change the shape of the foot, disrupt its normal growth, deforms the toes, contributes to the formation of difficult-to-heal ulcers, and in the cold season - frostbite, increases sweating. Shoes that are too loose are also harmful. Walking in it quickly gets tired, and abrasions can occur, especially in the area of \ u200b \ u200bthe rise.

Support area and stability are sharply reduced. The torso leans back. Such a deviation at the age, when the pelvic bones have not yet healed, causes a change in its shape, changes the position of the pelvis, which in the future may adversely affect the birth function. In this case, a large lumbar bend is formed. The foot rolls forward, the toes are compressed in a narrow toe, the load on the forefoot increases, resulting in a flattening of the arch of the foot and deformation of the toes. In shoes with high heels, it is easier to tuck the leg at the ankle, it is easy to lose balance.

The outsole should bend well. A hard sole makes it difficult to walk (the bending angle is limited, the heel of the shoe is pulled from the heel), reduces the performance of the ankle muscles, increases the temperature of the skin of the legs and sweating.

As much as it is necessary to provide maximum mobility in the forefoot, it is also necessary to ensure maximum heel stability. The heel counter must be strong, not allowing the foot to slip. The back should protect, tightly cover the heel, prevent its deformation.

In winter, shoes must be warm. For this purpose, fur, felt, cloth, felt are used. On cold winter days, not lower than –10 ºC, schoolchildren can wear boots and boots with foam rubber, insulated with synthetic fur (lavsan with cotton) or woolen or felt lining. With chronic cooling of the legs, vascular spasms occur and serious nutritional disorders of the leg tissues develop due to the obstruction of blood flow. In the summer months, the most hygienic lightweight open shoes with a wide neckline are sandals, sandals, leather shoes or shoes with leather soles with a top made of textiles and other materials with a porous structure (matting, denim, etc.). Such shoes promote good ventilation and rapid evaporation of sweat due to air circulation around the foot (thanks to the selection of

material, but more often to the openwork pattern of the shoe upper).

In wet rainy weather, rubber boots or shoes with soles made of waterproof materials, rubber, rubber, nylon, etc. are comfortable. woven straw or cardboard. Care must be taken to ensure that the lining does not get wet.

Shoes that meet hygiene requirements help to avoid unpleasant, sometimes painful, phenomena. Thus, the shoes should not squeeze the foot, disrupt blood lymphatic circulation, and impede the natural development of the foot. There should be a space of 0.5-1 cm in front of the thumb.

The hygienic requirements for shoes for children and adolescents consist of the requirements for the design of the shoes, due to the peculiarities of the structure of the foot during the growth period, and for the materials from which the shoes are made. The size, style and rigidity of the bottom of children's shoes should not hinder the development of the foot.

The foot of a child at an early age differs significantly from the foot of an adult in its anatomical and physiological structure. The children's foot is characterized by a radial shape, in which the greatest width is noted at the ends of the toes. The foot becomes fan-shaped. A different ratio of the heel to the forefoot: children have a relatively longer back (heel), which should be taken into account when designing shoes. The skeleton of the foot in childhood is formed by cartilage. Ossification is completed only with the end of growth (approximately 21 years), so the child's foot can easily deform under the influence of mechanical stress. In this regard, such qualities as the thickness, flexibility of the sole, the weight of the shoe, as well as heat-shielding properties are subject to hygienic regulation.

The main elements of the shoe's cut are the upper - this is the toe, heel, vamp, boot and bootleg, and the bottom is the sole, insole, heel. The toe part should be wider than the beam (part of the foot at the level of the metatarsophalangeal joints). The toe is the outer part of the upper of the shoe that covers the surface of the toes up to the level of the metatarsophalangeal joints. Toe - A piece of the top that is positioned between the lining and the top in the forefoot to maintain its shape. It protects the toes from injury, and its length should not exceed the area of the metatarsophalangeal joints. The back is a part of the upper of the shoe, located in the heel part to maintain its shape. The back should protect the heel, prevent its deformation, prevent the foot from sliding up and back. Thicker genuine leather is used for the production of the backdrop. The production of shoes without a backdrop is allowed for children over 11 years old. Vamp - leather patch on the toe and instep of the boot, as well as the front of the shoe blank. Shaft - the part of the boot that covers the lower leg.

The height of the shoe is normalized depending on its type and genus. The bottom of the shoe (insole, sole, heel) should have optimal stiffness indicators: resistance (expressed in N / cm) to bending along the line of the connecting head and metatarsal bones up to an angle of 25 degrees. "The flexibility of footwear is regulated and should be 7 N / cm for gusarik shoes, 10 N / cm for preschool shoes, 9-13 N / cm for boys 'school shoes, and 8-10 N / cm for girls' school shoes."

The sole is the main element of the bottom of the shoe. The outsole should have optimal flexibility, thickness, mass and thermal insulation properties. The heat-shielding properties of sole materials depend on their thermal conductivity. The lower the thermal conductivity, the higher their heat-shielding properties. In terms of heat-shielding properties, porous rubber is significantly superior to leather and monolithic rubber. At the same time, with an increase in the humidity of the environment, the heat loss of natural leather made of wool (felt boots) increases, and the heat-shielding properties of porous rubber do not change. This creates the advantage of using porous rubber soles in children's shoes, which can provide not only heat-shielding properties, but also thickness, flexibility and anti-slip properties of the shoe. In the summer, wearing shoes with rubber soles, including microporous ones, leads to increased sweating of the legs due to the complete lack of vapor and air permeability. For children's shoes, thread and combined fastening methods are allowed, which provide greater flexibility in the beam area, ease with the use of porous rubber, polyurethane and other materials, it is possible to use glue and injection methods of fastening, ensuring the waterproofness of the shoes, which is necessary in the autumn-spring and winter periods. The thickness of the sole is normalized depending on the materials and type of footwear. what is needed in the autumn-spring and winter periods. The thickness of the sole is normalized depending on the materials and type of footwear. what is needed in the autumn-spring and winter periods. The thickness of the sole is normalized depending on the materials and type of footwear.

The insole is an inner part of the shoe that has contact with the skin of the foot and contributes to the creation of a comfortable temperature and humidity regime in the inside of the shoe space. It must have high air and vapor permeability. It should be made only from genuine leather.

The heel artificially raises the arch of the foot, increasing its springiness, protects the heel from bruises on the ground, and also increases the durability of the shoe. When resting on a bare foot (without a heel), most of the load falls on the back of the foot. The absence of a heel is allowed only in shoes for young children (booties), while the child is not walking. In shoes with a heel of 2 cm, the load is distributed evenly between the forefoot and the hindfoot. In shoes with high heels, that is, above 4 cm, most of the load falls on the forefoot (with a heel height of 8–10 cm, the load on the forefoot is 7 times

greater than on the back). Heel height: for preschoolers - 5-10 mm, for schoolchildren 8-10 years old - no more than 20 mm, for boys 13-17 years old - 30 mm, for girls 13-17 years old up to - 40 mm.

Children's shoes should have a secure and comfortable fit on the leg, which does not impede movement. For this, various types of fastening are used: lacing, Velcro, belts, zip fasteners, etc. Open shoes without fasteners (like “boats”) are not acceptable for school shoes. The weight of the shoe depends on the materials used, construction and type of fastening. The norm of the weight of the shoes is normalized.

Genuine leather is recommended for the top of children's shoes for all-round seasonal use. it has high air and vapor permeability, softness, flexibility and heat-shielding properties. for summer footwear, along with leather, various textile materials or their combinations with leather are used: matting, denim, etc. cotton materials. For the manufacture of children's shoes, polymer materials or natural materials can be used with the attachment of chemical fibers, which are regulated by sanitary norms and rules. Shoes for everyday wear on the street or at school should be simple, comfortable in shape, with wide low heels (1–2 cm). Then walking will not be tiresome.

There are also specific requirements for the color of children's shoes, and they differ depending on the age of the child (models for babies are always brighter, more cheerful, and for older children they are darker, more practical). Our parents are not too fond of easily soiled light shades (they can only be in girls' summer shoes and sandals), as well as non-standard tones suitable for clothes of a strictly defined color. We especially dislike the yellow one, although according to all forecasts it will be relevant this season.

Boys' preferred colors include black, gray, dark blue and brown, as well as beige sand and marsh green. Do not like the traditionally boyish blue and bright green. A different, more radical color scheme, including red and orange, is popular among older boys, and the latter are increasingly used not only as bright finishing touches, but also as the main two. School-age children can be divided into two subgroups: primary school-age children and adolescent children.

To revive the production of children's shoes in the Southern Federal District and the North Caucasus Federal District, it is first of all necessary to create a number of shoe industry enterprises in the following constituent entities of the districts with a pronounced socio-demographic situation and employment of the population in the republics: Chechen, Dagestan, Ingush, Kalmyk.

Newly created enterprises need state support, because they do not have enough own funds, and borrowed funds are not available due to the high cost. It is necessary to solve at the enterprises the general tasks of technological renewal of the industry, replenishment of working capital, increasing the efficiency of scientific and technical support of production for the manufacture of high-quality and affordable children's shoes.

It is necessary to intensify the work of regional and municipal bodies of social protection to organize targeted assistance to children and their parents, including large and single-parent families.

We believe that this is a problem not only of private business, but also of the state. the downward trend in oil prices is becoming persistent, which worsens the economy and, if no measures are taken in industry, can lead to a decrease in real annual GDP growth rates (due to a decrease in the level of profitability). This will lead to serious negative consequences for the economy. The positive development of the economy could be without a shock, if the state provided "start-up" assistance in the revival of light industry, since today the light industry remains in crisis, which explains the unemployment and low quality of life, especially in small towns, where until 1992 the city-forming sewing, shoe and other enterprises were necessarily functioning.

It is worth noting that in the volume of light industry products today, only a fifth is produced by small enterprises. Reasonable expectations are paradoxical here: according to the proposals of the Chamber of Commerce and Industry of the Russian Federation and the Russian Union of Industrial Enterprises, it is obvious that in 2022 the permissive scale of restrictions on the production volumes of small enterprises will significantly increase (!), After the introduction of which the volume of footwear production by small enterprises will grow no less than, than up to 60-70% of the total production.

And once again in development of the above. For what reason is this growth not systematic? After all, there is the main thing: an immense market (the taxable base for the import of goods and light industry products increased by $ 746 million; loyal consumer; capacities; qualified personnel; competitive advantages (easing tariffs for electricity, water, land, etc.) According to the achieved production volumes and its dynamics, it is realistic to predict the successful completion of the industry in 2025, but ... everything is in the hands (minds) of the business community, since one cannot count on preferential conditions from the state.

I would like to believe that the order of the Prime Minister of the Russian Federation will be fulfilled at least in terms of reducing the volume of shadow (counterfeit, falsified and contraband) products on the market, and domestic footwear will find its consumer. The acute situation in the production of children's shoes at most Russian shoe enterprises, including in the Southern Federal District and the North Caucasus Federal District, is associated with the abolition of subsidies from the federal budget, with imperfect

taxation of children's assortment and insufficient production of pads for its production. On the consumer market of the Southern Federal District and the North Caucasus Federal District of goods for children, domestic producers were ousted by foreign manufacturers who supply cheaper footwear from low-quality materials. However, this product, for the most part, does not have conformity and hygiene certificates.

Providing children with properly selected, physiologically sound footwear is one of the main tasks for domestic manufacturers. Domestic children's shoes are manufactured in accordance with strict standards. This is also ensured by the interstate standard MGOST 26165-2003 “Children's footwear. General technical conditions ", which defines the general requirements for footwear manufacturers both in Russia and in the CIS countries.

Children's shoes are divided into groups by gender and age:

1) for toddlers;
2) little children;
3) preschool;
4) for school girls;
5) girlish;
6) for schoolchildren-boys;
7) boyish.

Age group (0-4 years old)

For toddlers, motor-tactile forms of cognition of the surrounding world come to the fore. Shoes for this age, first of all, should be easy to put on and fasten on the leg. The fittings will attract the attention of the child only by their functionality. Contrasts in the lines of articulations and color remain attractive for the attention of the baby.

Age group (5-9 years old)

In preschool and young children, perception becomes meaningful, purposeful, and analyzing.

The child's perception specially organized by the constructor will contribute to a better understanding of the phenomena of the surrounding world.

Therefore, in the shoes created for children, the maximum manifestation of the principles of harmony should be present.

Age group (10-14 years old)

The third age group of children - children of school age - can be divided into two subgroups: children of primary school age and children of adolescence.

It is advisable to use a stylized image of a shoe model for children of primary school age in order to promote the development of the child's thought process: to stylize the image of cars, plants, insects. The decorative finish becomes a compositional center, therefore various buckles, brooches and other accessories significantly "refresh" the model and make it unique. A buckle of a simple geometric shape (square or circle), but with a small intricate pattern, will make the child look at it, and, therefore, concentrate his attention. Designers can use fittings that are complex in geometric shape, and by using different colors, they can help the child isolate simpler geometric bodies from the overall complex shape. Such developments in various versions will help train children's thinking to determine a complex shape.

A teenager is an observer, contemplating the world from the outside, studying it as a complex phenomenon, perceiving not so much the diversity and presence of things as the relationship between them. He already clearly knows what kind of footwear is needed and for what purposes, and from the presented models for a certain purpose he chooses, in his opinion, the best one, thinking at the same time how it will look in the eyes of his comrades. In adolescence, the emotional background is uneven, unstable. A child strives for adulthood, claiming equal rights with elders, he considers himself a unique person, but at the same time does not want to differ from his peers in anything external. The new position manifests itself most often in the appearance, including shoes: the teenager likes adult models, but in brighter and bolder manifestations. That is why youth fashion is so specific.

Shoes for this group should be, on the one hand, beautiful, meet fashion trends, and on the other hand, comfortable, comfortable, taking into account the fact that they have not yet completed the formation of the foot and shoes should exclude the development of pathologies. It must necessarily have distinctive features, that is, it must be the shoes that their peers wear today, today. Shoes may differ in color, style of the sole, there may be differences in design features both when assembling the blank of the upper of the shoe and fixing it on the leg, that is, the shoe may have an individual distinctive feature. Teenagers are advised not to wear tight shoes. Wearing it often leads to curvature of the fingers, ingrown nails, the formation of calluses and contributes to the development of flat feet. Flat feet are also observed with prolonged walking in shoes without any heels,

Adolescents aged 15-17

A separate group is a group of adolescents aged 15–17 years, for which shoes are created as a separate group, in which designers must take into account the peculiarities of youth fashion, in some way repeating adult models, but without a high heel and a strongly tapered toe, so as not to damage almost formed foot. Very young children are becoming consumers of shoes for men and women. So, boys buy men's shoes from the age of 11 (9%), by the age of 13, from 40 to 60% use men's shoes, and from 15 years and older - almost 100% of adolescents. the situation with shoes for girls is even more difficult. Women's shoes are purchased by 40 to 70% of 10-year-old girls and almost all girls aged 13 and over. Shoes for this age group should not only correspond to fashion, but be produced in a wide range, so that a teenager with its help can emphasize his individuality. Shoes can vary

both in color and in the shape of the sole, various design features of the upper of the shoe and methods of attaching it to the foot can be used.

The consumer always faces a choice, which is a priority for him - the level of comfort of the shoe, hygiene, durability, resistance to external influences or price. Currently, artificial membrane materials have been developed that successfully compete with natural ones. The main advantage of these materials lies in their multilayer structure. They provide the same moisture protection as real leather.

Children's shoes should have a secure, comfortable fit on the foot that does not impede movement. For these purposes, modern fashion uses different types of fasteners: belts, zippers, rubberized inserts that fasten quickly and look modern. However, doctors recommend using laces for school shoes. With their help, you can adjust the height of the rise, which means, provide more comfortable conditions for the foot.

Teenagers have their own requirements for the choice of shoes. They prefer what is fashionable in adults. Therefore, there is a demand for classic, sporty and extravagant footwear for "advanced" teenagers.

Teenagers prefer sports style low shoes. Modern models of sports shoes have a specially designed ventilation system: sometimes a mesh or valves built into the sole are used, sometimes the instep support of the model has holes that allow the foot to "breathe", so more and more sports shoes are offered as school and teenage shoes.

Currently, an important trend in children's footwear fashion remains - the desire for maximum comfort. Everything is involved: design solutions, modern materials, the latest technologies. High platform-like soles have gone out of fashion (which is very harmful for a fragile children's foot), the toes have rounded, acquiring comfortable outlines. Teenage fashion shoes have small but pronounced heels. Exquisite fittings, fancy materials, textured leather, metal spraying, etc. The tops of girls' winter boots, just like those of their mothers, are decorated with fluffy fur edges, mink fur appliques, buckles and chains with rhinestones.

In order to form an idea of the assortment of the footwear market in the Rostov region, we analyzed the assortment of children's footwear in the trading network in the city of Shakhty, which is shown in table .1.

Table 1 - Structure of the assortment of children's footwear by prices

Shoe manufacturing companies	Types of shoes	Price categories, rub.							
		up to 100	100-300	300-600	600-900	900–200	1200-1500	1500-1800	1800-2000
"Antelope", Moscow city	sandal-strap			NS					
	Boots					NS	NS		
	Sport shoes				NS				
"Kotofey", Yegoryevsk, Moscow region	shoes orthopedic				NS				
	Boots			NS	NS	NS			
	Boots							NS	
	Low shoes				NS	NS			
"Thomas", Moscow region	Shoes little children			NS					
	Boots little children			NS					
Bombini ", Moscow city	Shoes teenage			NS					
	Boots teenage						NS		
	Low shoes for teenagers					NS			
"Bagheera", Voronezh	Shoes						NS		
	Boots							NS	
	Boots								NS
RIL, Rostov-on-Don	Sandal-strap		NS						
	Czech women	NS							

Based on the analysis of the assortment of children's footwear supplied to the retail network, it can be concluded that, in general, the demand for footwear is satisfied at the expense of manufacturers from other regions (Figures 8).

Figure 8 - Assortment of winter children's shoes

Figure 9 - Assortment of spring children's shoes

Figure 10 - Assortment of summer children's shoes

Figure 11 - Assortment of autumn children's shoes

Features of the development of an assortment of women's shoes

Women's footwear is produced in accordance with the interstate standard GOST 19116-2005 “Model footwear. Technical conditions ".

When compiling a new assortment, the company's management should remember that the product combines tangible and intangible parameters to meet consumer demand. A new product implies a modification to an existing product or innovation that the consumer considers significant. For a new product to succeed, it must have the parameters desired by consumers, be unique.

Such parameters for fashion shoes are the following features:

– beautiful appearance (namely: skorma (silhouette), material, color, decorations, design (performance), interior decoration), grace, elegance, compliance with the fashion trend;

– plasticity, lightness, flexibility;

– the comfort of the shoe to wear, which is due to the conformity of the shape and size of the shoe to the shape and size of the foot;

– the ability of the manufactured footwear to maintain the outer and inner shape and dimensions during the entire service life.

Of particular importance in shoes for the buyer is the correspondence of the proposed models to the fashion direction, which now calls for moderation and restraint, the restoration of ties with nature.

From the 40s and 70s. XX century. platforms are back in fashion, combining contrasting colors or

different shades of the same color. The footwear differs from the previous seasons mainly in the changes in cut and volume, it uses fewer accessories than in the previous periods. The shape of the toe becomes narrower, and the high heel strives more and more for stability. Classic stiletto heels, triangular and rectangular steady heels are in fashion. Many heels with inserts of mirrored materials in different sizes. Metal heels or half metal heels are still fashionable.

Velor and suede are the leading materials. It doesn't matter whether natural materials or artificial - the main thing is that the shoes look spectacular. Patent leather, which is extremely popular in shoe fashion today. Also, in new models, materials of different textures or high-quality natural materials are often combined with artificial ones.

Black returns to the color palette with the addition of red, white, silver, bronze decor or an unexpected explosion of pure gold. Black is followed by brown, beige, as well as caramel and cognac shades, which have acquired some depth and often tend to red and purple, dark red, mustard, wine, elegant dark blue. Often the palette consists of muted tones interspersed with bright purple and scarlet [40].

In the range of shoes for winter, classic boots with low heels with decorated multi-colored details or a freely draped bootleg are relevant. Over the knee boots with or without a high stable heel are also in vogue. Laces, straps, buckles, buttons, various metal fittings are welcome as decoration.

In the assortment of women's shoes for spring and autumn, ankle boots are the undisputed favorite. They can be very diverse: with fur trim, textile inserts, V-neck, all kinds of straps, buckles, decorative buttons and buttons ... They are usually ankle-high, and quite loose, with a narrow or brown-shaped nose. Variants in retro style with a slightly rounded and raised forefoot are possible.

Fashion for the summer provides a wider and more interesting opportunity for renewal. Models are based on open heel and alternating structures. Combinations of straps of various thicknesses, as well as criss-cross and T-shaped straps are widely used.

Special requirements apply to elegant women's shoes. Actual design solutions - boat shoes, low shoes. Modeling compositions of this style comes down to developing a purely constructive basis for the model, often with the rejection of excessive decorativeness and a return to strict and clear lines. The fittings are distinguished by the complexity of shapes and jewelry finishing using precious stones.

According to GOST 19116-2005, leather is used on the outer parts of the upper of shoes according to GOST 939-88: cowhide, outgrowth, chevro with a natural front surface, smooth, with a relief surface, with the finishes "nubuck", "velor", as well as according to GOST 9705- 78 patent leather.

For the inner parts of the top, in particular for the lining, leather is used for shoe lining in accordance with GOST 940–81, a bike in accordance with GOST 29298–92, natural fur in accordance with GOST 4661–76. For winter footwear, insert insoles are used, consisting of two layers. In this case, the first layer is natural fur in accordance with GOST 4661–76, the second layer is cardboard in accordance with GOST 9542–89, which are glued and trimmed around the perimeter.

According to the interstate standard GOST 19118-2005 “Model footwear. General technical conditions "for the toe cap, thermoplastic materials according to TU 17-21-592-87 are used, which have good elasticity and rigidity. For backdrops, thermoplastic materials are also used according to TU 17-21-958-73.

For the details of the interlining, use thermal bond TU 17-21-92-76, bumazeya-cord according to GOST 19196-80.

For women's winter boots, molded soles based on thermoplastic elastomers are used according to TU 17-21-492-84, since this material is resistant to abrasion, highly elastic, frost-resistant, does not slip on snowy roads. For summer and autumn-spring footwear, leather fiber soles are used according to OST 17-92-71.

They use heels of various heights and shapes made of ABS plastic according to OST 17-331-80.

The main insoles are made of shoe cardboard of the SOM brand in accordance with GOST 9542–89. The main half-insoles are used to strengthen the heel-and-heel assembly in shoes with the adhesive fastening method on medium, high and extra high heels, which are made of PSM cardboard in accordance with GOST 9542–89.

For laying, use is made of cardboard of the PR brand in accordance with GOST 9542–89, which has a low rigidity, ie. resistant to repeated bending, stretching and compression.

Foam rubber is used as a soft heel pad in accordance with TU 06-1688-78.

For the shank, metal is used according to OST 17-24-83.

The assortment of women's fashion shoes that can be offered to shoe pre

As an example, consider the technical description of women's winter model boots (model B).

Model B technical description:

- genus - women's shoes;
- view - boots;
- intended purpose - model;
- construction of the shoe upper blank - stitching detail of the vamp, decorative boot strap;
- difficulty category - the second;
- the nature of the processing of the visible edges of the outer parts of the top - in a fold;
- method of fastening on the foot - zipper;
- shoe style - 845281M:

8 - for women's shoes;

4 - for insulated shoes;

5 - the height of the heel portion is 50 mm;
2 - the shape of the toe is medium;
81 - serial number of the block in the series;
M - for fashion shoes.

Table 3 shows the assortment of shoes with the indication of the time of release of the models during the year (by month).

Table 3- Assortment of women's shoes

Genus, type, purpose of shoes	Symbol shoe models	Release time of the shoe model throughout the year
Womens summer shoes	figure 4.5 (model A)	April May
Women's autumn boots	figure 4.6 (model B)	June August
Women's winter boots	figure 4.7 (model B)	September - November
Womens spring shoes	figure 4.8 (model D)	December - February

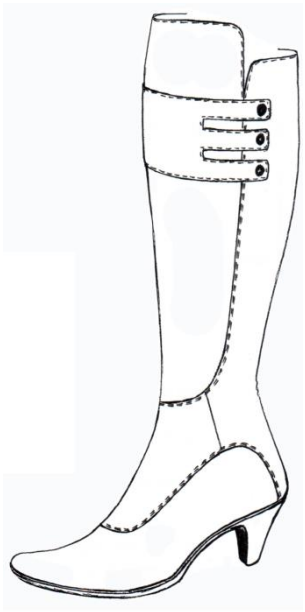
From the presented assortment, the basic model B has been selected: socks model for the winter season, since it is the most time consuming.

Model A

Model B

Figure 12 - Assortment of women's summer shoes

Figure 13 - Assortment of women's autumn shoes



Model G

Model B

Figure 14 - Assortment of women's winter shoes

Figure 15 - Assortment of women's spring shoes

Figure 16- Office Shoes

Figure 17 - Shoes for outdoor activities

Features of the development of the range of men's shoes

When developing a competitive assortment of men's footwear, manufacturers need to take into account many factors affecting consumer demand: compliance with the main fashion trends, economic, social and climatic characteristics of the subjects of the South and North Caucasus Federal Districts.

It is quite difficult to find differences in men's shoe fashion of individual seasons - the difference is barely noticeable. The most intense period in the development of men's fashion is the last 10 years. In connection with the ongoing changes in the habits of the new generation, "formal" men's shoes, just like clothes, have gone beyond the usual "urban" and "fashionable" in the traditional sense of these words.

Major changes will take place in men's shoe fashion for the fall-winter 2021–2022 season. They will touch on the shape of the pads, materials, colors and decor. But the main changes will still affect the style of the collections: the slightly forgotten retro and newfangled techno-sport style will come to the fore.

Men´s shoe fashion will continue to evolve in three stylistic directions: classic, comfortable and sporty, but next season the influence of retro will be very noticeable. Along with the "timeless" classics - the designs of oxfords, derbies and chelsea - such long-forgotten footwear details as leggings will return to fashion. two more novelties from the series “new is

well forgotten old" - boots with a wide adjustable belt - an overlay fastened with two small buckles, as well as loafers. The latter - low shoes with an oval insert (most often imitated) - are sometimes decorated with an overhead strap or a lace with a tassel. However, retro will manifest itself not so much in the borrowing of old designs, as in the decor and finishes typical for this style, such as patterns from perforations and others.

Another contemporary style is techno sports, which is increasingly influencing urban fashion. Monochromatic sneakers of brown, gray and greenish-marsh shades, which may not be shiny, but made of smooth leather in combination with velor or nubuck, are relevant. Today it is customary to wear this very comfortable and practical type of footwear even with a classic suit.

Significant changes will also occur in the shape of the lasts of men's shoes. Perhaps, such a variety of their types and so many innovations have not been brought before by any season! All types of toes are relevant: rounded, pointed, bob-shaped, rounded-trapezoidal, rounded bob, etc. At the same time, many models have a stylish hump in the toe or vamp part of the shoes, so a pronounced bob with a hump in the vamp area or narrow noses with convex "nodule" at the very tip.

The bottom of the shoe will also change: the soles thicken, noticeable welts and corrugations appear on the running surface.

The range of materials used in the next season will also significantly expand. But genuine leather, both smooth and with all sorts of special effects, will remain the undisputed favorite. Along with metallization, toning, polishing, and non-paint are fashionable. Exotic leathers do not lose popularity: crocodile, snake, ostrich, kangaroo, fish, including tinted and patent leather. Pile materials are coming into fashion again: suede, velor and nubuck, but they are often used in combination with patent leather or smooth leather. There are laser-coated velor and vintage leather, as well as polished wrinkled and crinkled.

Short-cut natural fur is often used in winter shoes: ponies or cavallino. It is fashionable to cut it out with outlandish patterns.

Textiles and felt are relevant, which are used for the manufacture of ankle boots, bootlegs. Especially popular are fabrics in chunky plaid or embellished with logos.

But the decor of men's shoes does not shine with a wide variety and is generally modest: small metal buckles and bridles made of white metal or blackened are relevant. In the spirit of the fashionable retro style, perforation patterns combined with stitching and cut-out details are popular. Thin leather cords and hand seams with thick thread are common. These are, perhaps, all types of jewelry typical for classic and comfortable models. Sneakers are slightly richer: logos, embroideries and applications in the form of numbers, letters, emblems, logos, as well as textile ribbons with various inscriptions, stripes, but they, as a rule, are made to match the main dark color of shoes.

The color scheme of men's shoes in the autumn-winter season is modest and rather monotonous. Dark and practical shades of black, brown and beige are popular. Against this gloomy background, shades of mocha and cocoa look very unusual [19].

In the spring-summer season of 2021, men's fashion will not undergo drastic changes. However, it is also impossible to say that absolutely no changes will take place. The men's wardrobe will noticeably expand at the expense of shoes, expensive sneakers and summer sandals, often reminiscent of women's models.

Along with classic lace-up low shoes, stylish shoes will also appear in summer men's fashion. These are moccasins and loafers with a low oval insert or tongue, noticeably lightweight, soft, comfortable, on a thin studded or leather sole with plastic breakouts.

Shoes are beautifully decorated with embroidery, including contrasting, and sometimes gold threads, mainly on heraldic or nautical themes, and moccasins are decorated with bridles, adjustable straps (made of contrasting material or striped rep ribbons), tassels, flags. In moccasin shoes, the oval insert is often made of exotic leather (especially fashionable hand-painted python) or leather with embroidery or embossing. Also popular are braids, both real and stamped on the leather, and frequent curly perforations.

It is always fashionable to be sporty. Equipment for different sports is being introduced into everyday life. And first of all, this applies to shoes. Sneakers, sneakers, sneakers, pantolettes are worn not only for training, but also in the office, school, institute, and, which is very important, they look stylish and trendy. The toes of sneakers, sneakers, sneakers are rounded, without a characteristic rise; Of the fastening elements, lacing dominates, as a rule, lowered, close to the toe. Low shoes and shoes are structurally relevant, with the exception of only some types of sneakers with high ankle boots. The assortment of footwear for outdoor activities uses a lot of fabrics: cotton, linen, blended with fashionable floral, abstract (pop art), animalistic (under the skins of wild animals) heels. Smart "sports" materials, nets, breathable climatic membranes, perforated imitation leather. For men, we offer textiles in a cage, stripes, pie-de-bullets, with graffiti-style drawings, etc.

Shoes, reminiscent of sports sneakers, are made of genuine leather, often with inserts of gold, bronze or silver metallized leather, which effectively contrasts with a matte toe or edging made of suede or velor. Typically sports elements or materials, nets, for example, or stitching decorative stripes are also made of leather. The solution to the bottom of the shoe is also interesting: along with the typical sneaker,

massive sole, some models have a leather, opanny type, with plastic breakthroughs through the leather or a rubber sole, consisting only of toe and heel parts. Some sneakers resemble sneakers made of leather, including embossed varnish. In summer, white and beige models with inserts of gold, silver, black, blue, red or brown will be especially relevant.

Gradually they are being introduced into the conservative men's wardrobe and strappy sandals, which have significantly supplanted the position of the sandal. Unlike the latter, sandals are noticeably more open and entirely consist of various weaves of belts. Particularly relevant are models with a strap that wraps around the thumb (the other holds the leg up), and sandals with an interdigital bridge, reminiscent of leather flip flops. True, their color scheme is still quite conservative: black, white, brown and various beige shades.

Assortment of men's shoes

Figure 18- Assortment of winter men's shoes

Figure 19 - Assortment of autumn men's shoes

Men's lace-up shoes are noticeably lightened for the summer season. They are made of thin soft leather, sometimes without lining, and also have a thin sole, including leather with plastic islands. Both oxfords (with topstitch ankle boots) and derby shoes (with topstitching toe) are relevant, finishing - frequent perforations that are very fashionable this season. But the main highlight is the bright, unusual for men's

classics, the color of low shoes, for example, pink, blue or purple. Two-tone models are also relevant, especially black and white, white-gray, gray-blue and beige-brown.

The range of men's footwear relevant in this region is shown in Figures 18–25. The offered range of men's footwear is manufactured in accordance with GOST 26167-2005 “Casual footwear. General technical conditions "and in accordance with GOST 19116-2005" Model footwear. General specifications.

Figure 20 - Assortment of men's spring shoes

Figure 21 - Assortment of summer shoes

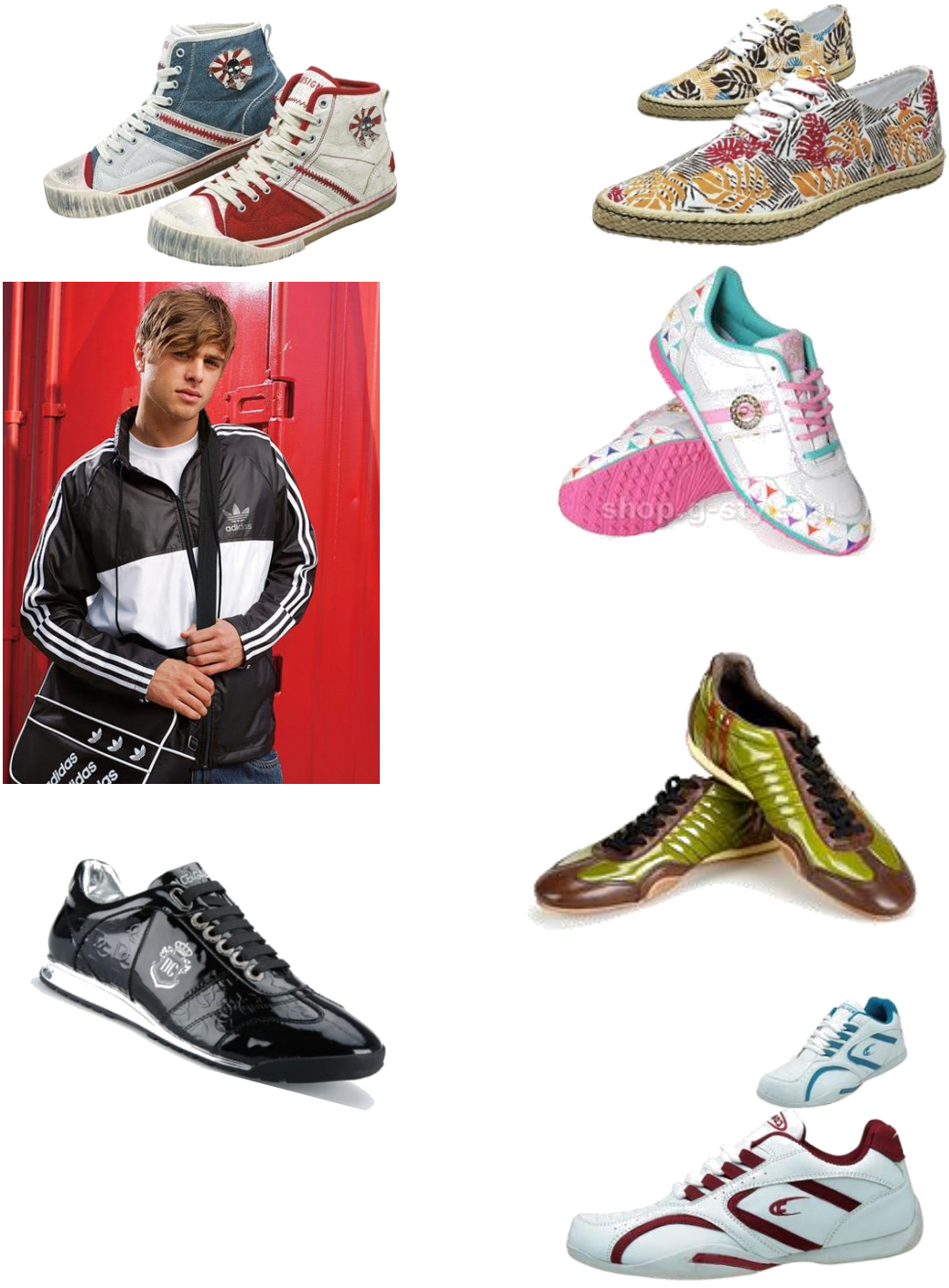


Figure 22 - Range of footwear for outdoor activities

Figure 23 - Assortment of men's work shoes and special shoes for the military

Figure 24 - Assortment of men's strap-sandal shoes

Figure 25 - Office men's shoes

The choice of basic materials for the range of shoes

According to GOST R 26167-2005 “Casual footwear. General technical conditions "on the outer parts of the upper of the shoe, leather according to GOST 939–88, leather from split leather according to GOST 1838–91 must be used. For the basic shoe model, we use chrome tanned half-leather leather in accordance with GOST 939–88. It has an average thickness, all the necessary requirements, and a low cost.

On the inner parts of the top, the following should be used: for lining - leather in accordance with GOST 940-81, fabrics for shoe lining - in accordance with GOST 19196-93, natural fur - in accordance with GOST 4661-76 “Dressed fur sheepskin. Specifications ", artificial fur according to GOST 28755-90" Fabric-stitched artificial fur. General technical conditions ", woolen fabrics according to normative and technical documentation. Lining materials for men's everyday low shoes should have higher vapor permeability, moisture permeability, hygroscopicity, moisture release than materials for the upper of shoes, high abrasion resistance and sweat resistance. Since the basic model is autumn men's low shoes, for the lining and insoles we use pork lining leather in accordance with GOST 940–81, which has good vapor permeability.

On the intermediate parts of the upper of the shoe should be used: for the interlining - coarse calico, bumazey-cord, teak-twill in accordance with GOST 19196-93, nonwovens in accordance with regulatory and technical documentation; thermoplastic material TU 17-21-447-82. For the basic shoe model, we use a thermoplastic material for the lining according to TU 17-21-186-77.

According to the interstate standard GOST R 26167-2005 “Casual footwear. General technical conditions "for a toe cap, leather according to GOST 29277-92, elastic and thermoplastic materials according to regulatory and technical documentation should be used. We use thermoplastic materials according to TU 17-21-592-87, which have good elasticity and rigidity.

For backdrops we also use elastic thermoplastic materials according to TU 17-06-19-77. According to the interstate standard GOST R 26167-2005 “Casual footwear. General specifications "for the outer details of the bottom of the footwear should be applied: for the sole - leather according to GOST 29277-92, rubber according to GOST 10124-76, GOST 12632-79, polyurethane, thermoplastic elastomers, leather fiber, rubber according to regulatory and technical documentation. For men's autumn low shoes we use soles molded on the basis of polyurethane according to TU 17-21-529-85, since this material is resistant to abrasion and highly elastic.

An insole unit is used as the inner parts of the bottom, which consists of a main insole made of SOP cardboard in accordance with GOST 9542–89, a main half insole made of PSP cardboard in accordance with GOST 9542–89 and a metal shank in accordance with OST 17-24–83. For laying we use PR cardboard in accordance with GOST 9542–89, which has a low rigidity, that is, it is resistant to repeated bending, stretching and compression.

The method of fastening the bottom depends on the purpose and design of the shoe, the materials from which it is made. A wide variety of methods for attaching the bottom allows you to make shoes with different properties.

One of the main indicators characterizing the consumer properties of footwear is the strength of the attachment of the soles to the upper of the footwear. To ensure the established standards for the strength of the fastening of soles, it is necessary to select materials for shoe parts both in terms of properties and thickness. The flexibility of the shoe depends on the properties of the materials, the design of the parts and the method of their fastening, the higher the rigidity, the greater the effort of the foot to bend the shoe when walking, the longer the period of molding the shoe during the wear process. The greatest stiffness is for shoes of the nail method of fastening, the lowest for thread fastening methods, and the smallest for glue. This method is also the least material-consuming and labor-consuming (the average coefficient of labor intensity of making shoes with the glue method of fastening is 0.47, and for shoes made by the welded method - 1,

With the development of chemicalization of production, adhesive methods for fastening parts of the top and bottom of shoes have become widespread. Currently, the glue method has become the main one, it is produced up to 85% of all shoes.

Its advantages include:

- high labor productivity;
- simplicity of equipment;
- ample opportunities for mechanization and automation of production;
- product weight.

In addition, a distinctive feature of adhesive joints is their ability to highly elastic deformation while maintaining high strength throughout the entire service life.

The disadvantages of this method include the dependence of the strength of adhesive joints on low or high temperatures, as well as the need for occupational safety measures in production due to constant evaporation of solvent and other harmful substances from adhesive compositions, which requires significant material costs. But by choosing the right glue and gluing technology in accordance with the product design and the mechanical properties of the materials to be glued, the disadvantages of this fastening method can be minimized.

Taking into account the mild climatic features of

the South and North Caucasian Federal Districts, the design features of the upper and lower parts of the shoe, the physical and mechanical properties and the thickness of the materials, it is proposed to use the glue method of attaching the sole to the blank of the shoe upper for the selected range of men's shoes. It is also advisable, since it does not require additional costs for the purchase of equipment for other fastening methods, but this does not exclude the possibility of using other fastening methods in the future, which will significantly increase the range and save materials. Therefore, it is worth including in the assortment the models of strap-sandal shoes of the welted and dopple method of fastening, presented in Figure 5.17. This is the distinctive feature of the presented assortment.

Due to the large number of employees on the territory of the Southern Federal District, men's wardrobe requires the presence of office shoes, which are noticeably lightweight, soft and comfortable (Fig. 5.18). This very comfortable and practical type of footwear can be worn today even with a classic suit.

It should be noted that the production of special footwear is one of those niches in the Russian economy where one can successfully compete with imported products, since there are potential large customers represented by various ministries and departments. But in this area, there is also fierce competition. For example, today small business shoe manufacturers offer an adhesive fastening method, which is applicable in the production of special shoes for officers. This not only does not contradict the harsh requirements of national GOSTs, but significantly increases the aesthetic and ergonomic properties of products. This is not only the internal affairs bodies, customs, departments and companies that require uniform ammunition, but also oil workers, miners, metallurgists, asphalt workers, as well as employees of numerous gas stations, forced to work in winter almost knee-deep in snow-salt,

For the top of special footwear, yuft or combined materials (leather with tarpaulin), tarpaulins with refractory impregnation (OP) for asphalt shoes, soles are oil and petrol resistant (MBS) and thermal oil and petrol resistant rubbers, leather, microporous rubber are used. Now, basically, special footwear for the military is produced by the injection method of fastening, and only the glue method of fastening is used to produce special footwear for officers. The production of special shoes for law enforcement agencies is based on the conclusion of contracts between law enforcement agencies and shoe manufacturers, as well as on holding open tenders, therefore, if a tender for the production of special shoes is not received, it is possible to produce men's casual shoes with an adhesive fastening method.

Organization of a wide range of footwear production will make it possible to turn today's subsidized regions of the Southern Federal District and the North Caucasus Federal District into self-sustaining ones, thereby increasing the level of income of the population, provoking the creation of new jobs; will ensure the development of small business and support legal private entrepreneurial activity, as well as create the basis for getting out of the shadows of a significant part of the turnover of the real sector of the economy in order to form the regional budget, since the proposed project for developing a strategy for the development of the production of competitive leather goods in the Southern Federal District and the North Caucasus Federal District is to itself economic, political and social effects.

Figure 19 shows an assortment of fall shoes. We choose model B, which is a men's low shoes with a molded PU sole, an adhesive fastening method. The way of fixing on the foot is side elastic bands. The visible edges of the outer parts of the top are trimmed and folded.

This shoe can be made on the last style 913265, 275.6.

9 - type of footwear, man's;

1 - type of shoes, closed;

3 - the height of the heel elevation, 30 mm;

2 - the shape of the toe part of the shoe, medium;

65 - serial number in the series;

275 - the size of the shoe in the metric system;

6 - completeness.

The assortment of men's shoes with an indication of the time of release of models during the year (by months) is presented in table 4.

Table 4 - Assortment of men's shoes

Genus, type, purpose of shoes	Footwear model conventions	Time of release of the shoe model in throughout the year
Men's summer clogs with a leather upper on a molded sole of the adhesive fastening method	figure 4.14, model G	January March
Men's winter boots with leather upper with molded TPE sole, adhesive fastening method	figure 4.11, model A	July - September
Men's autumn ankle boots with molded PU sole, adhesive fastening method	figure 4.12, model B	April June
Men's spring shoes with leather upper with side elastic and stitching vamp with molded PU sole, adhesive fastening method	figure 4.13, model B	October December

From the presented assortment, the basic model was chosen - men's everyday low shoes with molded soles for the autumn season of socks (model B), since it is the most time consuming, corresponds to the main fashion trends and the climatic conditions of our region. For the successful operation of enterprises, a high level of renewal of the range of footwear is required. The main objects of renewal are the means of labor (equipment, tools, objects of labor, basic and auxiliary materials, components), production technology, organization of production and labor, and, finally, the footwear itself. The renewal of the first three objects is directly reflected in the renewal of the shoe assortment. Socio-economic factors also play a significant role in updating the range of footwear: the level of income of the population, the degree of saturation of the market with footwear, consumer demand and fashion. Under the influence of fashion, not only the shape of the shoe, the number of parts and their arrangement changes, but also the nature and methods of processing parts and their connections, finishing, materials used, etc. The factors that determine shoe renewal are shown in Figure 25.

The directions of renewal of the assortment of footwear are determined by various combinations of factors. So, under the influence of scientific and technical factors, the production of new shoes is possible using new technology on existing equipment using previously used or new materials, using existing technology on existing equipment using new materials, using new technology on new equipment, etc.

The production renewal is of a chain nature. So, a change in technology is usually accompanied by a complete or partial change in the design of shoes; the introduction of new equipment requires the improvement of technology, and the latter is associated with the design of the product.

The large variability of socio-economic factors of product renewal, as well as the influence of socio-economic factors, make it possible to distinguish three types of renewal of the range of products that are characteristic of shoe enterprises.

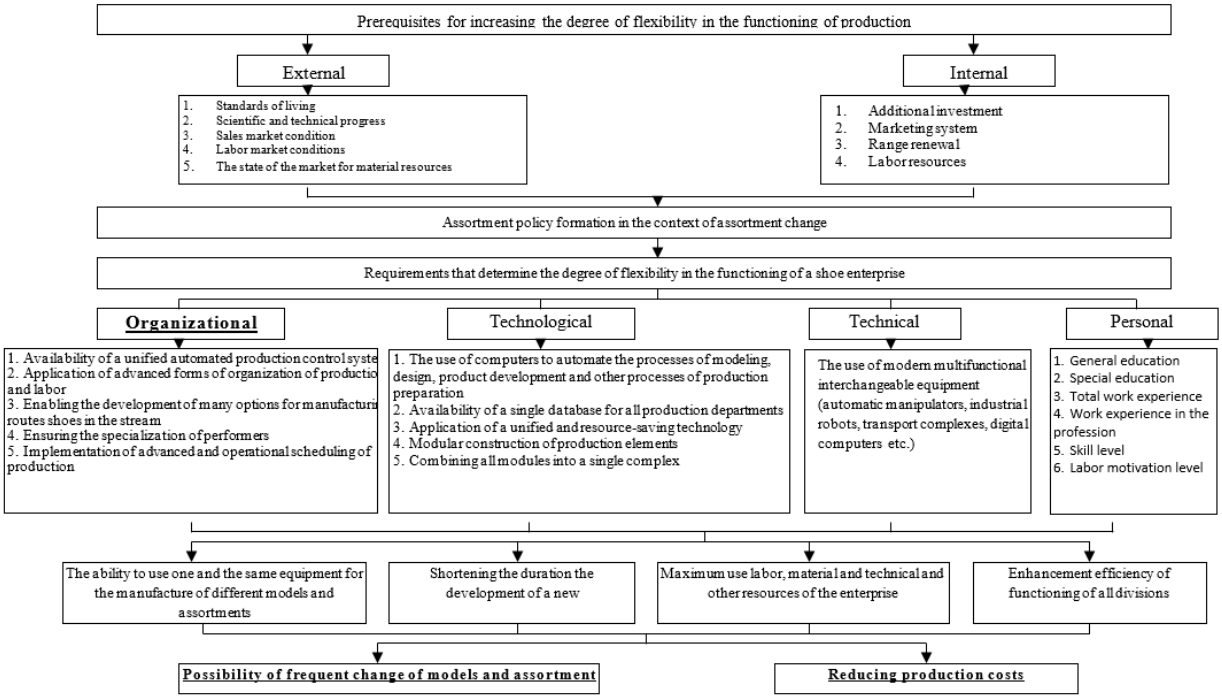


Figure 25 - Characterization of requirements for increasing the degree of flexibility of operation Production in conditions of multi-assortment production

The first type of renewal of light industry products is characterized by the introduction of products that are fundamentally new in terms of design and technology, which have not been previously produced at any enterprise and are the result of scientific research and design work. These products are distinguished by new consumer properties and technical and economic indicators, tk. are produced according to new technology using new materials based on nano technologies and on new equipment using innovative technologies.

The second type of renewal of the product range is characterized by the fact that the company creates modifications of previously produced products to extend the maturity phase of their life cycles.

The third type of renewal of the range of light industry products is characterized by the development of the production of fashionable novelties and high-quality products, fashionable structural elements, fashionable styles, new types of materials, and the release of especially elegant products in small batches. This type of renewal also includes the seasonal change of the product range. The third type of renewal of the product range is most closely related to the change in fashion, it contributes to the growth of the competitiveness of the enterprise and the formation of a positive innovative image.

Each of these types of renewal of the range of products is characterized by its own complex of works, organizational features, duration of development, etc. Each type of update is also characterized by its own time intervals, within which the selected direction of the update is relevant. After a certain time, new, more progressive technological, technical and design solutions appear, therefore, the release of products based on previous solutions will lead to a decrease in the technical and aesthetic level and a deterioration in economic characteristics; such products of the enterprise will not be in demand among consumers.

To solve the problems of domestic light industry enterprises associated with updating and expanding the range of products, organizing the release of products that meet consumer requirements, research is needed in the field of managing the development process and launching a new range of products.

Product assortment management is the impact on the development processes, the formation of the composition and structure of the manufacture and sale of products in order to maximize the satisfaction of consumer demand with high technical and economic production indicators.

The development and implementation of control actions aimed at meeting consumer demand for products must be performed within the framework of a product range management system.

If we take into account that control actions are carried out through various kinds of activities, then the subsystem of product assortment management can be understood as a set of interrelated organizational, technical and social measures for the development, formation of the composition and structure, manufacture and sale of products in order to maximize the satisfaction of consumer demand.

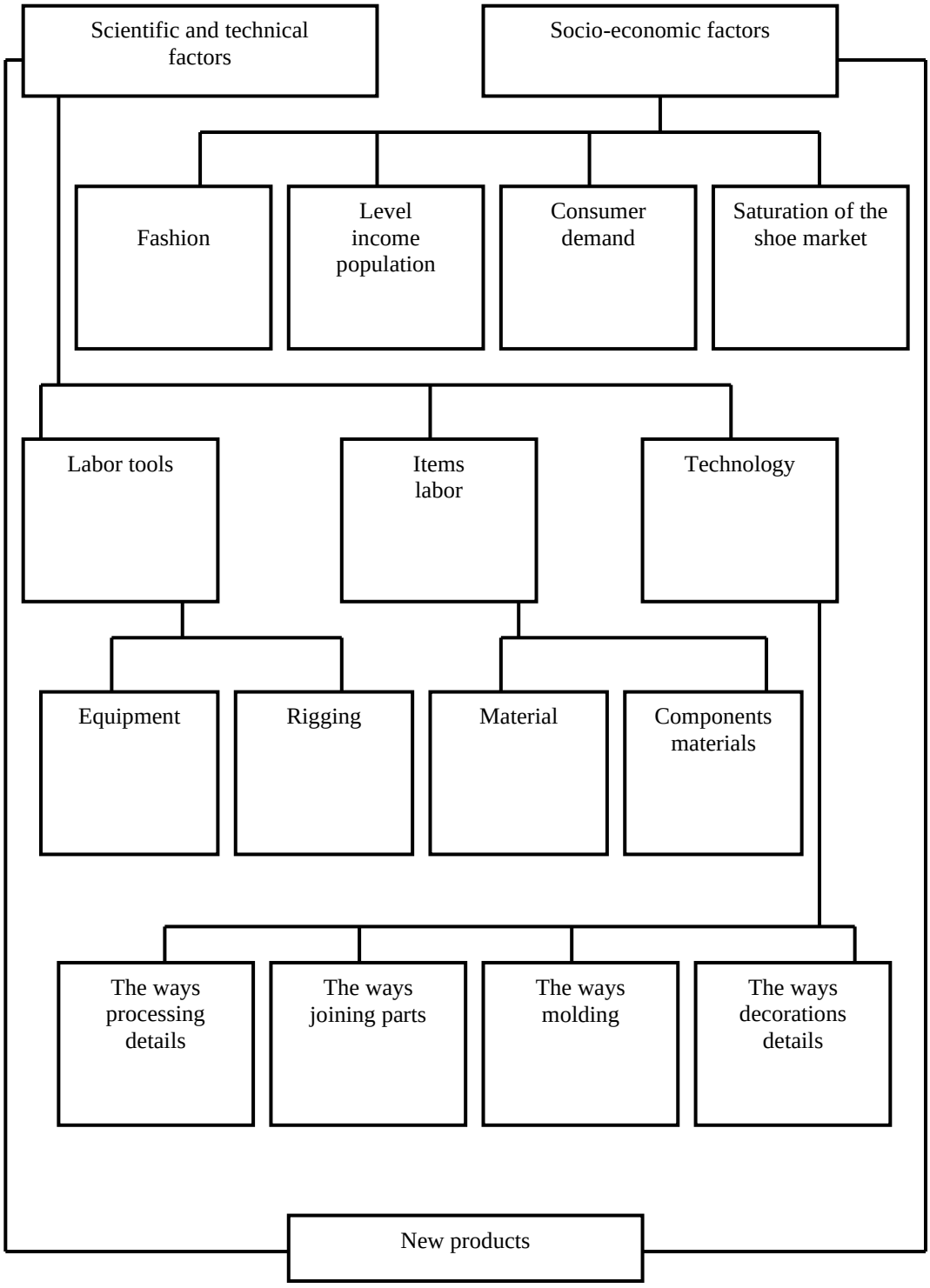


Figure 26. Factors determining the feasibility of product renewal

Among the main functions of the product range management system are the following:

– formation of the composition and structure of products;

– organization and operational regulation of production with the aim of the fastest possible transition to new models and the development of the required production volumes;

– organization of product sales.

In addition, the system performs the functions of collecting, processing and preparing information

necessary for the implementation of basic functions. These include:

– analysis of manufactured types of products;

– analysis of the assortment policy of the main competitors;

– putting forward proposals on the feasibility of producing a new type of product and phasing out products that are not in demand;

– analysis of consumer attitudes towards new types of products.

An important criterion for the competitiveness of footwear on the market is its cost with the corresponding quality, as well as the purchasing power of the population. The instability and dynamism of the external environment force enterprises to abandon the method of long-term planning based on the extrapolation of existing conditions, and switch to management methods based on foreseeing changes, setting goals for enterprise development.

Despite the individual nature of market research conducted by a particular shoe company, in the process of a comprehensive market study, it is necessary to perform the following independent, but interrelated and complementary research:

– filling with goods;

– market and its segmentation;

– customer behavior and consumer demand;

– analysis of the conditions of competition;

– forms of sales activities and measures to generate demand and stimulate sales.

Market research is carried out using a rich arsenal of various analytical methods, including questionnaires, various surveys, methods for analyzing patent information, methods of system dynamics, correlation-regression analysis, etc.

The main task of developing a marketing (market) strategy is to ensure sustainable commercial success of the enterprise, effective sales of products over a long period of time.

The market strategy is determined by the factors of demand, the level of competition and the general market situation and should ensure that the existing and potential advantages of the shoe company can be realized.

The availability of high-quality, competitive goods is a prerequisite for the highly efficient functioning of an enterprise. From this point of view, marketing can be viewed as a system of measures for the mutual adjustment of the product and the market in order to achieve sustainable commercial success by the enterprise.

In marketing theory, a product is a means by which a certain need can be satisfied, i.e. a set of useful properties of a thing. Thus, F. Kotler, a well-known specialist in the field of marketing, distinguishes the following components of the product, grouping them into three levels.

The first level is the fundamental characteristic of the product - its functional purpose, i.e. idea or concept of the product. A product in real performance has a number of characteristics that form the second level of product characteristics. These are such characteristics as the level of quality, specific design, brand name, packaging. And, finally, the third level is a set of additional services offered along with the product: after-sales service, a guarantee system, terms of delivery and payment for the product, accompanying documentation and the so-called "image" of the product, i.e. the image of the product and the image of the manufacturer of this product from the consumer of the product.

The solution of problems associated with the development of new products causes, first of all, the need to clarify and clarify the economic meaning of the concept of "new products".

The art of planning a shoe assortment is the ability to translate existing and potential technical and material capabilities into products that bring profit to the manufacturer, have consumer value that satisfies the buyer.

Assortment planning begins either from the moment needs are identified, or from the moment when, as a result of market research or on the basis of other information, a basic idea of the product has been formed. Regardless of the source of origin of the idea of a new product, it is necessary to conduct market research sooner or later in order to find out whether the conceived product meets a conscious or not yet realized need.

When forming the assortment policy of footwear production, it is necessary to take into account the in-house capabilities, which make it possible to diversify the assortment, satisfy the consumer and take into account the risk of lack of demand for the goods.

The network schedules for assortment planning, which can be developed at enterprises, allow you to determine the time from the moment the product is conceived to the start of its implementation in the region, with broad observance of the sequence of stages included in the assortment planning. The duration of the entire cycle can be reduced, but subject to the attraction of additional resources and the application of additional efforts at critical stages.

Highlighting the main characteristics of a product is of fundamental importance, since it is they who determine the directions of the creation of the new. To make a new product, sometimes it is enough to change at least one characteristic. Here it is important to consider those characteristics of goods, the difference in which leads to differences in the marketing activities of enterprises.

The formation of an assortment policy based on product assortment planning is a continuous process that continues throughout the entire product life cycle, from the moment the idea of creating it was conceived

and ending with the withdrawal from the product program.

The creation of a new product is a complex design task associated not only with achieving the required technical level of the product, but also with giving its design such properties that ensure the maximum possible reduction in labor costs of materials and other means for its manufacture, but at the same time meet the requirements of customers.

It should be borne in mind that all production areas are included in the work in a certain technological sequence, which depends on the technological complexity of the new product and the duration of certain operations, as a result of which a new procedure for performing operations is created. Due to the lack of production skills among workers when performing new operations, there is a decrease in labor productivity and the quality of work in the first days of production of new products, i.e. during the period of their development.

Designing a product to the proper level involves the need for criteria to evaluate its results. As such, indicators of the manufacturability of the design can act.

The development of principles and methods for performing design work, including a creative one, associated with the analysis of analogous models, the initial conditions for the formation of requirements for the product, the preparation of technical suggestions and selection of the best, assessment of the quality of the product.

Modern requirements for the organization of the process of developing new shoe models clearly show the shortcomings of methods of analysis, analysis and substantiation of decisions, inflexible and insufficiently coordinated with each other, based on the experience and intuition of the designer.

The design of footwear for various purposes is a traditional area of engineering, in which considerable development experience has been accumulated. Therefore, shoe design involves the use of previous experience, which is concentrated in recommendations for the selection of basic design solutions, descriptions of previously designed models, and typical design techniques. When analyzing analog models, it is necessary:

– study fashion trends in the development of footwear;

– to conduct a qualitative assessment of analog models - compliance with the specific purpose of the designed model, ergonomic compliance, perfection of the compositional solution.

Obtaining high-quality projects of shoe models largely depends on the quality of the analysis of possible options for solving the design problem, establishing the feasibility of designing a new model.

Many firms are striving to improve the efficiency of the new product development mechanism, realizing that there is a complete relationship between the success of new products and the financial well-being of the enterprise.

The creation and introduction of new products into the market contains significant elements of risk. Research data show that out of 58 serious new product ideas, only four are fully developed, two are being introduced to the market, and only one is successful.

In addition, many new products fail already on the market: 40% for consumer products; 20% - for industrial goods; 18% - for various services, i.e. there is a high degree of market uncertainty.

The search for ideas about new products should be carried out systematically, and not on a case-by-case basis. The main sources of ideas for creating new products are:

1. Fundamental research (aimed at obtaining new knowledge and indirectly leading to the emergence of ideas for new products) and applied (purposefully using scientific methods to develop ideas about new products).
2. Observation of related products at exhibitions and fairs.
3. Reports and proposals of sales agents, sellers, dealers.
4. Trends in the development of new products by competing firms.
5. Supplier information.
6. Expert opinions.
7. Information in patents, catalogs, advertisements, etc.

Revealing the shortcomings of the manufactured products also allows the formation of new ideas for its improvement.

At the end of the development of a new product and the creation of prototypes, preparations begin for the final stage - production and sales. The most effective method by which you can assess the chances of success of a particular product is the trial (experimental) sale of small batches of a product in a controlled market in real competition. Test sales are designed to test in practice the demand for a new product for the market and to work out the technique of its marketing. This makes it possible to reduce the risk when organizing commercial production.

The positive results of testing new products on the market are the basis for the beginning of the final stage of the process of implementing the idea into a specific new product - the stage of its production development. A detailed plan for the production of a new product is being developed: sources of supply with materials, components, equipment are being investigated, working drawings are being prepared, products are being launched into production.

All stages of creating a new product must be carried out in a short time. Shorter development time increases competitiveness, because the cost of a new product must be recouped before it becomes obsolete and loses demand as new competing products enter the market.

Any product, regardless of the degree of its novelty and quality, goes through a certain life cycle. Knowledge of the features of the product life cycle is a prerequisite when working with an assortment. The concept of the product life cycle can be briefly formulated as follows: any product lives - i.e. stays on the market for a limited time - maybe for many years, or maybe for several months or weeks. The volume of its sales and the amount of profit made during the life cycle change, and the nature of the change for different products is similar. Over time, the indicated values first slowly increase, then they grow rapidly, then their growth slows down, their value stays at a certain level and begins to fall, at first slowly, then rapidly.

The period from the appearance of a product on the market until the end of demand for it is called the life cycle of the product. Several stages can be distinguished in it:

1 - introduction of the product into the market;

2 - growth in sales volume and profit;

3 - product maturity;

4 - decline in sales and profit.

The life cycle of a product ends with its withdrawal from production due to the lack of demand for it. The division of the life cycle curve into parts and the allocation of stages is conditional, therefore, in the special literature on marketing, there are descriptions of different options, but most often these four are distinguished.

Consideration of the classical curve of the product life cycle (LCT) is quite common in domestic and foreign methodological literature. The stages of the life cycle are analyzed in detail and a forecast of the stages is proposed based on the experimental data of similar goods and their extrapolation over a short period of time. The classic life cycle curve is the relationship between the volume of sales of goods and the corresponding periods of time, reflected in the classical two-dimensional coordinate system along the "x" axis, in which the current time is positively plotted, and on the "y" axis - the volume of sales. In the standard adopted in domestic and foreign literature, the product life cycle curve is divided into a number of intervals characterizing the product (usually there are 5 of them), which are assigned the appropriate names. In most cases, they are called "product origin", "market introduction",

The average life cycle of consumer products is shown in the graph in Figure 27 and in Table 5.

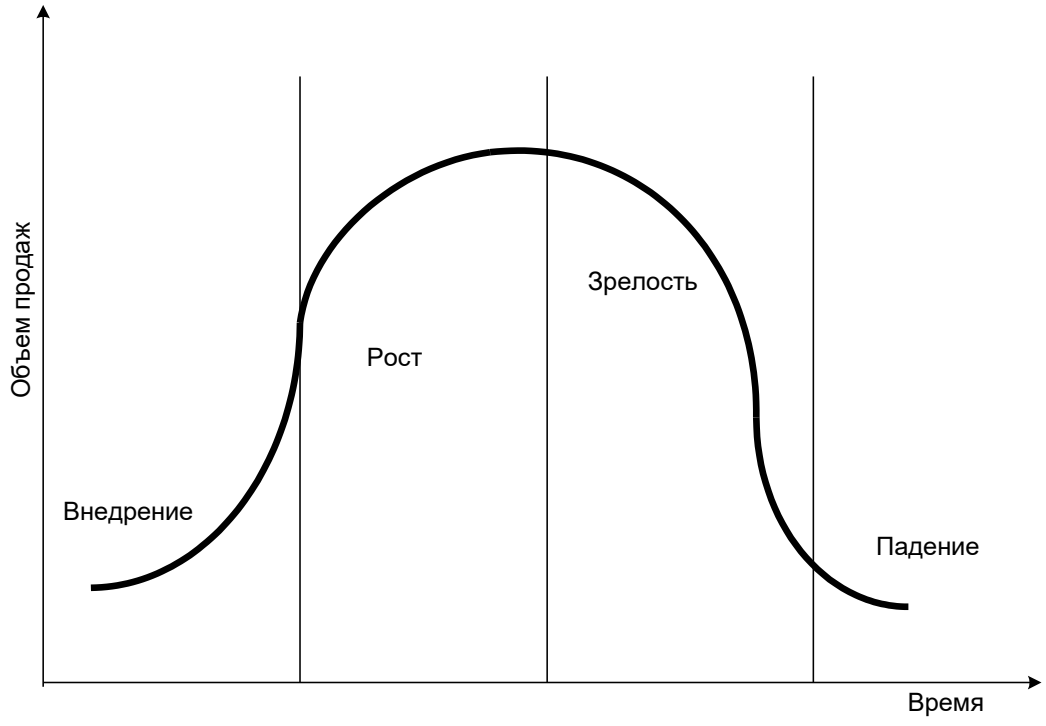


Figure 27 - Average life cycle product range

Table 5 - Average life cycle of the manufactured product range

Phase	Phase description in terms of agile development
1. Implementation	From production start to breakeven
2. Height	From the break-even point to the middle of the life cycle
3. Maturity	From the middle of the life cycle to the beginning of the development of a new product range
4. Fall	From the start of production of a new range of products to the end of production of a given range of products

The life cycle of a product in a real situation may not be expressed on the graph of the traditional classical curve, in which the periods of publication introduction into the market, growth, maturity, saturation and decline are clearly defined. Depending on the specifics of individual goods and the characteristics of demand for them, there are different types of life cycle, differing both in duration and in the form of manifestation of individual phases.

In addition to the classical form of the product life cycle (Figure 28), the practice of various enterprises gives examples of its specific modifications.

Effective marketing allows you to achieve high sales and profit growth at the first stage, and in the subsequent stages - to maintain a significant volume of sales (curve called "boom"). The boom curve (Figure 29) describes a very popular product with stable sales over time. In the case of such a product life cycle curve, the firm produces the product and makes a profit for a long time.

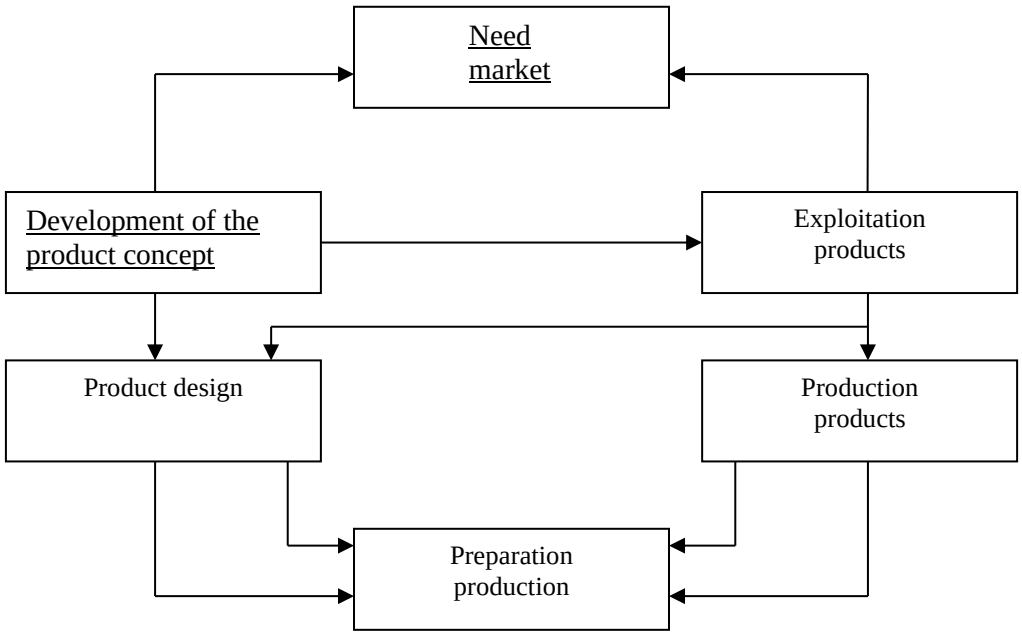


Figure 28 - Stages of the product life cycle

The life cycle of a publication can be expressed as a “craze” curve, where sales of a publication rise sharply and then plummet.

The entrainment curve (Figure 30) describes a product with a rapid rise and fall in sales. Often a trendy, popular product has such a curve.

Continuous craze implies a rapid increase in product sales, then a rapid decline, but with a residual average level of sales. The continuous entrainment curve (Figure 31) also describes a popular product, but this product is still preferred by some consumers.

The fashion curve, or seasonal curve, refers to the life cycle of publications experiencing periodic, varying in time, repeated ups and downs in demand, etc. The curve of such a product that sells well over certain periods of time is shown in Figure 32.

The curve of a new start or nostalgia (Figure 33). The demand for this product falls, but after a while it

resumes. An example would be the return to women's platform shoes that were popular in the 70s.

Failure curve (Figure 34). It characterizes a product that almost immediately ceases to be in demand among buyers.

Curve of new rises (Figure 35). Such a curve is characteristic of products whose sales cease to grow, but after a slight improvement and the appearance of additional useful properties, the enterprise manages to increase sales again.

Failed withdrawal curve (Figure 36). Such a curve is characteristic of products that were unsuccessfully planned and carried out to be launched on the market, but with a repeated attempt to introduce them, they received great success.

In the theory of agile enterprise development, interest in the concept of the product life cycle lies in the replacement of goods in a recession phase with new ones.

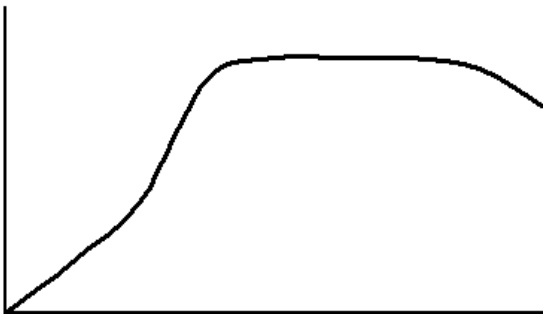


Figure 29 - Boom Curve

Figure 30 - Entrainment curve

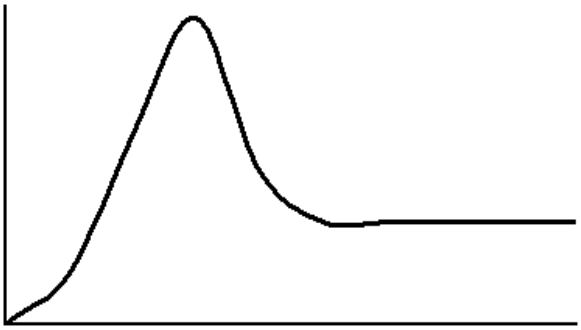


Figure 31 - Curve long-term passion

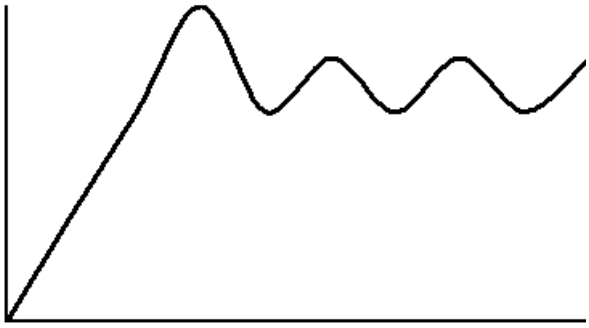


Figure 32 - Curve seasonality

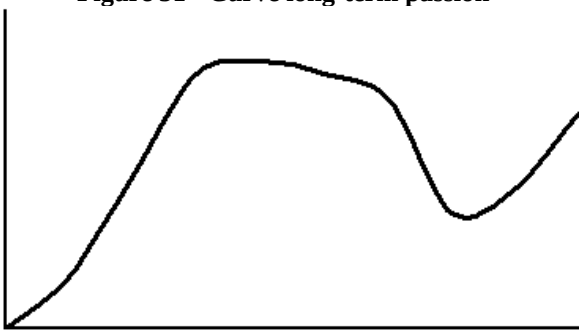


Figure 33 - New start curve or nostalgia

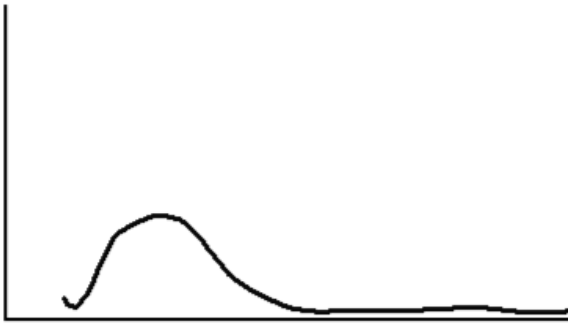


Figure 34 - Failure curve

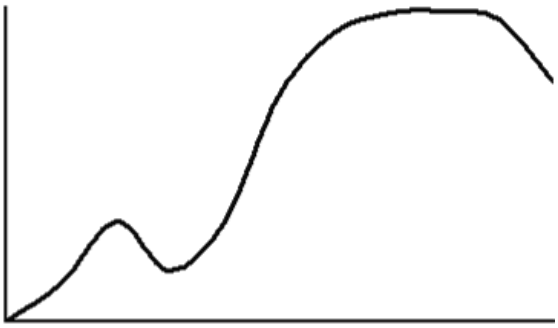


Figure 35 - Curve of new ups

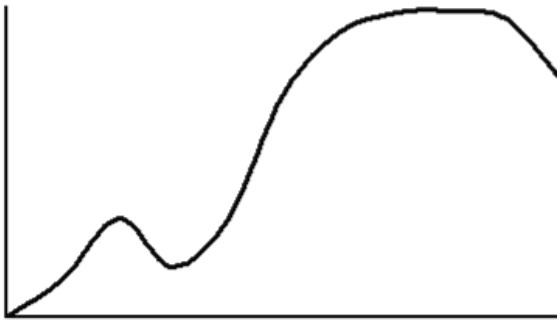


Figure 36 - The curve is not successful excretion

All other things being equal, a change in the production time (duration of the product life cycle) will affect the value of the optimal number of shoe models under development. At the same time, the longer the life cycle, the less the number of products needs to be developed by the enterprise and, conversely, the shorter the life cycle, the greater the number of such products.

Assessment of the phases of the life cycle allows you to plan the cyclicality of their turnover, the timeliness of replacement of products and the development of analogs, thereby reducing the degree of risk and, ultimately, providing flexibility in the development of the enterprise.

The experience of leading foreign firms shows that the economic efficiency of their activities is largely determined by innovation activity, i.e. creation and implementation of new products that provide profit on average 28% higher than traditional ones. According to the definition given by F. Kotler, new products include products that have undergone any changes in form, content or packaging that may be important for the consumer and serve as the basis for the formation of his preferred attitude towards the products of this company. When introducing new products, firms try to find the optimal solution that meets both the market requirements and the available equipment and technology capabilities.

Thus, the study and consideration of the stages of the life cycle of products allows you to appropriately optimize the structure of the product range. A prerequisite for the effective operation of the enterprise is the rational planning of production that meets the needs of the market. The formation of the assortment of light industry enterprises should be based on representative information about the existing requirements, their possible dynamics and customer preferences. Marketing research is used to improve the efficiency of the existing management system at enterprises, adjust production and implementation programs to respond to changes in the market. Marketing research is the main regulator of the company's product policy when choosing directions for development.

A survey was chosen as a method of marketing research. The survey, used most often in various types of research, is a universal method of conducting marketing research. It has a high degree of objectivity, high accuracy of the data obtained, and a relatively low cost. the most accurate data has a mass survey, i.e. polling a large number of respondents. One of the most important stages of planning a mass survey is sampling. An individual representative of a certain population group acts as a unit.

When determining the sample size, it should be borne in mind that the purpose of the survey is to obtain data characterizing the so-called general population, i.e. all carriers of any important trait.

The main idea of the sample is to judge the general in part, so the sample size should be such that it is representative of the sample. Questioning is a variation of the survey method. The study involved one hundred randomly selected men aged 18 to 55 years, the survey was conducted in the shops of Shakhty and Rostov-on-Don.

The purpose of the survey is to identify preferences in men's shoes for further research of the technological processes of its production for the population of the South - North - Caucasian federal districts and, in particular, the Rostov region. Shoes should be in real demand, and its design and aesthetic characteristics most fully correspond to the consumer preferences of this population group. Based on the results of the study of consumer preferences, an assortment of shoe models was proposed that meets the requirements of consumers.

Models on a single base differ in the materials used for the top and bottom of the shoe and in the degree of processing of parts and assemblies. In addition, a change in the color scheme of each of the presented models will allow you to transform the presented assortment endlessly, instantly reacting to market requirements, and correspond to the fashion trend.

Thus, seemingly similar models are manufactured according to various technological processes, which has a significant impact on their cost. As a result, the price of manufactured models varies

in a wide range, which allows the company to respond more quickly to fluctuations in demand and increase its market share, and, consequently, improve its economic performance. The shoe market of the South and North Caucasian Federal Districts is oversaturated with types of footwear for the same purpose. Therefore, the head of the enterprise needs to know exactly what will be in demand on the market and how it should be implemented so that the developed range of footwear is chosen by the buyer, withstanding the fiercest competition that generates new proposals.

For all this, it is important to build an assortment policy in such a way that, if footwear of the same type arrives on the market, it should differ significantly in price, but meet the requirements of the standard.

The most important task of building the elements of the operational management system for the assortment of a shoe enterprise is the choice of technology that can effectively implement the intended goals in a complex multi-level hierarchical management system. The use of mathematical methods and optimization theory makes it possible to effectively make decisions not only in those conditions when the system parameters are known, or they can be represented as fixed values.

New approaches to determining the total number of footwear produced, depending on the market situation, prevailing prices and demand, and developing an optimal plan for the production of footwear models are proposed.

To determine the total number of shoes produced, depending on the market situation, prevailing prices and demand, it is proposed to apply elements of the theory of fuzzy sets. The theory of fuzzy sets has long been applied, mainly for use in systems that imitate human behavior, such as pattern recognition systems, linguistic analysis, search for solutions and others, in which there is no access to the complex mathematical apparatus necessary to describe complex industrial control systems and were highly specialized systems. This approach allows in each case to agree on the requirements of the problem and the required degree of accuracy of its solution.

Techniques based on the theory of fuzzy sets make it possible to use approximate, but at the same time, methods of describing non-deterministic systems that are sufficiently effective, for the analysis of which it is impossible to use standard quantitative mathematical methods. At the same time, all theoretical substantiations of this approach are quite accurate and are not in themselves a source of uncertainty (fuzzy logic and IS).

Unlike traditional mathematics, which requires precise and unambiguous formulations of patterns at each step of modeling, fuzzy logic offers a completely different level of thinking, thanks to which the creative process of modeling occurs at the highest level of abstraction, at which only a minimal set of patterns is postulated.

The basic idea behind fuzzy logic is that you cannot define rules for all occasions. These rules are discrete points in a continuum of possible situations and decisions are made by approximating them. For each case, the known rules for similar situations are combined. This approximation is possible only in cases where there is flexibility or blurring in the words with which these rules are defined. To use the capabilities of human logic in production processes, a mathematical model is needed. To implement such a model, fuzzy logic was developed, which allows describing the decision-making process and its search in an algorithmic form.

When solving problems that contain fuzziness in their formulation and have ambiguity of goals (multicriteria) "maximum income with minimum costs", it is possible to operate with fuzzy input data, namely:

– values continuously changing in time (dynamic tasks);

– values that cannot be set unambiguously (results of statistical surveys, advertising campaigns, etc.).

There is a possibility of a vague formalization of the evaluation and comparison criteria: operating with the criteria "majority", "possibly", "predominantly", etc .; the ability to quickly simulate complex dynamic systems and their comparative analysis with a given degree of accuracy. Using the principles of system behavior described by fuzzy methods, it does not take a lot of time to find out the exact values of variables, draw up describing equations and evaluate different variants of output values.

The developed system makes it possible to build a control model with an unlimited number of input parameters and control blocks and thereby describe the behavior of rather complex control objects. etc.

Conclusion

The quality is "written by nature" to be at all times in the epicenter of scientific and amateurish reflections. The problem of ensuring the quality of activities is not just universal, relevant, it is strategic.

Thus, solving the problem of increasing the efficiency and competitiveness of the economy, and ultimately the quality of life, is impossible without the implementation of a well-thought-out and competent industrial policy, in which innovations based on digital production and quality should become the priority areas of the state's economic policy.

The problems of improving the quality and competitiveness of materials and products at the present stage of development of the Russian economy are becoming increasingly important. As the experience of advanced countries that at one time emerged from such crises (the United States in the 30s, Japan, Germany in the postwar period, and later South Korea and some other countries) shows, in all cases, the basis of industrial policy and recovery

economy, a strategy was put in place to improve the quality and competitiveness of products, which would be able to conquer both domestic and foreign sales markets. All the other components of the reform - economic, financial, credit, administrative - were subordinated to this main goal.

The developed software for the formation of the technological process for the production of import-substituted products and the determination of specific reduced costs, which are the sum of current costs (prime cost) and capital investments, commensurate with the standard efficiency factor, taking into account the production program, makes it possible to calculate the static parameters of the technological process of production of import-substituted products when various forms of organization of production.The developed software for calculating cash flows from the operating activities of light industry enterprises based on assessing the degree of implementation and dynamics of production and sales of products, determining the influence of factors on the change in the value of these indicators, identifying on-farm reserves and developing measures for their development, which are aimed at accelerating turnover production and reduction of losses, which guarantees light industry enterprises to obtain stable TPE and prevents them from bankruptcy.

Models of product sales within a month at 100%, 80%, 50% are proposed. Calculations indicate that with 100% of the sale of shoes, compensation is provided for the costs not only for the production and sale of shoes, but also a net profit of 1,900.54 thousand rubles remains, which indicates the effective operation of the enterprise, as well as the correct marketing assortment. enterprise policy. Also, profit is obtained from the sale of 80% of men's, women's and children's shoes. If less than 50% of footwear is sold from the production volume, the enterprise will incur losses. To solve this problem, the conditions for the sale of shoes in a specified period of time and the volume of sales of at least 50% are necessary.

Based on the current situation in the economy of our country, in our opinion, no less significant problem in the development of the regional consumer market is the lack of a full-fledged regulatory framework that ensures the functioning of the mechanism of state regulation of the consumer market in the regions. Based on this, it is the state and regional intervention that should correct the situation on the market of domestic products of light industry enterprises in the regions, and thus there will be an opportunity for the development of production of competitive and import-substituting products.

The implementation of the planned measures will lead to covering the deficit for all types of products, will ensure an increase in labor mobility in the Southern Federal District and the North Caucasus Federal District and a reduction in negative processes in the labor market, as well as a stable balance of interests of consumers, employers and bodies of municipal, regional and federal branches of government. For the successful implementation of all of the above measures, the interest of the regional authorities in the development of production of competitive and import-substituting products, reduction in prices for components and energy costs and benefits for the transportation of goods produced by enterprises in the regions of the Southern Federal District and the North Caucasus Federal District is most necessary.

Therefore, only a stake on innovation, quality, and competitiveness of products and services should be the basis of the industrial policy pursued at all levels yesterday, today, and even more so tomorrow.

Othe economic effect of work results is limiting, which consists in increasing labor productivity, the level of mechanization of production, lowering the indicators of work in progress and the cost of digital production. An accessible tool for digital production technologists is proposed to rationalize the design of technological processes, which allows an enterprise to form a competitive assortment and predict the maximum income from the production of import-substituting products.

An assortment policy has been developed for the formation of competitive products, taking into account factors affecting consumer demand: compliance with the main fashion trends, taking into account the economic, social and climatic characteristics of the regions of the Southern Federal District and the North Caucasus Federal District, the production of which using modern innovative technological processes, as well as to meet the demand of an elite consumer, with the use of manual labor create the basis for satisfying the demand for footwear for buyers in these regions.

Innovative technological processes have been developed for the production of import-substituting products using modern technological equipment with advanced nanotechnologies, which form the basis for reducing the costs of import-substituting products and ensuring their competitiveness with the products of leading foreign companies, with the possibility of a wide-range production of products not only by type, but also by sex and age. groups, which guarantees her demand in full.

The layouts of technological equipment are proposed, on the basis of which it is possible to form a technological process for the production of import-substituting products with an optimal volume of output, taking into account the production area and the form of organization of digital production.

Software has been developed for calculating cash flows from the operating activities of light industry enterprises based on assessing the degree of implementation and dynamics of production and sales of products, determining the influence of factors on the change in the value of these indicators, identifying

on-farm reserves and developing measures for their development, which are aimed at accelerating turnover production and reduction of losses, which guarantees enterprises to obtain stable TEP and prevents them from bankruptcy.

Software has been developed for the formation of the technological process of digital production and the determination of the cost of production of import-substituting products. A computer simulation model has been implemented that describes the dynamics of the process of manufacturing import-substituting products. The proposed methodology and software implemented on this basis can reduce the duration of technological preparation of production and increase, due to the rationalization of the technological process, the specific consumer effect of import-substituted products.

Comprehensive indicators of the effectiveness of innovative technological processes for the manufacture of footwear, similar to other types of import-substituting products, have been calculated. Taking into account the production program, promising options for technology and equipment have been formed, the most effective has been selected; the possibilities of streamlining the flow are identified, allowing to exclude bottlenecks, to minimize equipment downtime, which is one of the conditions for designing innovative technological processes. The reliability of the calculations for assessing the efficiency of technological processes by methods of target programming for various technological and organizational solutions is confirmed by calculations of indicators of economic efficiency: cost, profit and profitability and other indicators.

The proposed methodology allows to reduce the duration of technological preparation of digital production and reduce the time of expert work while maintaining the required depth and validity of engineering conclusions. The economic effect of the research is expressed in the intellectualization of the technologist's labor with a reduction in time spent on developing the range of manufactured import-substituting products and assessing the efficiency of technological processes in comparison with a typical economic calculation of the total cost of manufacturing such products.

The analysis of the influence of the forms of organization of digital production and manufacturing technology on the cost of import-substituting products is carried out using the example of the technological process of manufacturing children's, women's and men's shoes, taking into account the shift program. Theoretical dependencies have been obtained to assess the influence of the factor "organization of production" on individual calculation items as a whole and other technical and economic indicators in order to prevent enterprises from bankruptcy.

Thus, all this in aggregate will provide the enterprises of light industry in the regions of the Southern Federal District and the North Caucasus Federal District with a stable position both in the domestic and in the markets of the near and far abroad. All that is needed is the goodwill and interest of all participants in this process.

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