SOI: 1.1/TAS
DOI: 10.15863/TAS
Scopus ASJC: 1000

ISSN 2308-4944 (print)
ISSN 2409-0085 (online)

№ 11 (103) 2021

Teoretičeskaâ i prikladnaâ nauka

Theoretical & Applied Science

Philadelphia, USA

Teoretičeskaâ i prikladnaâ nauka

Theoretical & Applied Science

11 (103)

2021

International Scientific Journal

Theoretical & Applied Science

Founder: **International Academy of Theoretical & Applied Sciences**

Published since 2013 year. Issued Monthly.

International scientific journal «Theoretical & Applied Science», registered in France, and indexed more than 45 international scientific bases.

Editorial office: http://T-Science.org Phone: +777727-606-81

E-mail: T-Science@mail.ru

ISSN 2308-4944

International Scientific Journal

Theoretical & Applied Science

Editorial Board:

International Scientific Journal

Theoretical & Applied Science

ISJ Theoretical & Applied Science, 11 (103), 1218.
Philadelphia, USA

Impact Factor ICV = 6.630

Impact Factor ISI = 0.829
based on International Citation Report (ICR)

The percentage of rejected articles:

ISSN 2308-4944

Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
	GIF (Australia) = 0.564	ESJI (KZ) = 9.035	IBI (India) = 4.260
	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2021 **Issue:** 11 **Volume:** 103
Published: 01.11.2021 **http://T-Science.org**

QR – Issue QR – Article

Arthur Alexander Blagorodov
Institute of Service Industry and entrepreneurship (branch) DSTU
Bachelor

Vladimir Timofeevich Prokhorov
Institute of Service Industry and entrepreneurship (branch) DSTU
Doctor of Technical Sciences, Professor
Shakhty, Russia

Tatiana Pavlovna Lopatchenko
Don State Technical University
Ph.D. Associate Professor

Galina Yurievna Volkova
LLC TsPOSN «Ortomoda»
Moscow, Russia

ON THE EFFICIENCY OF DIGITAL PRODUCTION FOR MANUFACTURING QUALITY OF IMPORT-SUBSTITUTED PRODUCTS

Abstract: *In the article, the authors analyzed the possibilities of the policy and goals of enterprises in the field of quality within the framework of the QMS in order to fight for defect-free production, for reducing rejects and guaranteeing high quality of manufactured products to consumers. The need to improve the quality management system at domestic enterprises is due to the following important reasons: firstly, it is an increase in the confidence of potential consumers in the products that will be produced by domestic enterprises. secondly, it is an opportunity to significantly strengthen its position in existing markets, as well as significantly expand their spheres of influence by entering new domestic and foreign markets. And thirdly, this is a significant increase in labor productivity of any enterprise where it is planned to introduce QMS using digital production.The authors recommend that the market reconsider the concept of forming it with in-demand and import-substituting goods, taking into account their attractiveness. Such a concept will fully correspond to the desire of the consumer to satisfy his desire and desire to make a purchase, taking into account his social status, providing manufacturers with the sale of their products in full and guaranteeing sustainable TPE from their activities.*

Key words: *quality, import substitution, consumers, manufacturers, profit, sales, demand, demand, competitiveness, sustainable TPP, economic policy, financial condition.*

Language: *English*

Citation: Blagorodov, A. A., Prokhorov, V. T., Lopatchenko, T. P., & Volkova, G. Y. (2021). On the efficiency of digital production for manufacturing quality of import-substituted products. *ISJ Theoretical & Applied Science, 11 (103),* 101-123.

Soi: http://s-o-i.org/1.1/TAS-11-103-5 ***Doi***: https://dx.doi.org/10.15863/TAS.2021.11.103.5

Scopus ASCC: *2000.*

Introduction

UDC 335.17: 519.44

The choice of light industry enterprises as an object for assessing the effectiveness of the socio-psychological factor in the implementation of QMS is due to the fact that these enterprises are characterized by the presence of highly qualified workers and specialists. Thus, the Policy of goals and objectives of the QMS will be implemented much more

professionally and at lower costs due to three main aspects: employee involvement, process approach and systematic approach. In addition, the personnel of light industry enterprises are more efficiently able to implement the goals and objectives of the QMS also because control activities are more professionally provided for the implementation of the following situations: persuasion, execution of delegated powers, creation of conditions for increasing productive work and effective use of the business qualities of employees.

The authors of most of the studies justifiably paid attention to solving the problem of combining state and market mechanisms for managing competitiveness.because it becomes a strategic resource for the economy of these regions. Today, and even more so tomorrow, in the world economy, the place of price competitiveness will be taken by the competitiveness of quality levels, which has widely increased its importance in connection with Russia's accession to the WTO and the need to use ISO 9000 series, in this regard, an increase in the quality factor of the results of the domestic light industry in the strategy Competition in global markets is a long-term trend.

The task of increasing competitiveness is especially urgent for those enterprises that, due to external factors (increased competition due to globalization, the global financial crisis) and internal (ineffective management), have lost their competitive positions in the domestic and foreign markets. In response to negative processes in the external environment, the processes of regionalization and the creation of various network structures are intensified, one of which is the union of commodity producers and the state.

Based on the use of innovative technological solutions, the development of an assortment policy, taking into account the characteristics of these regions, reducing the cost of manufacturing products due to effective technological solutions with more frequent changes in the assortment while maintaining minimal costs for re-assembling the technological process and the formation of a pricing policy that creates advantages in the competitive struggle for markets with unstable demand.

Software has been developed that will allow tracking the flow of funds from the result of marketing policy in order to guarantee the enterprise a warning from bankruptcy. The examples of the calculation of the main technical and economic indicators are given, which allow the heads of the enterprise to make the only correct decisions that create economic stability for them.

Another very important factor that guarantees the success of manufacturers is the quality management of the manufacture of import-substituting products. The choice of a strategy for managing human resources in the practice of enterprises depends on this influence.

The cultural peculiarities of Russian entrepreneurs, according to the majority of researchers who used a systematic approach, include dependence on the team and the norms of behavior formed by it, the desire for trusting relationships, and avoiding irresponsibility. Personal qualities of an employee are often given priority over their success in performing their work; personal and business relationships are mixed. Also, our Russian reality has noticed a tendency of entrepreneurs and their employees to bribery, concealment of income from the tax service, forgery of documents, disregard for ethical standards in relation to competitors. There is a gap in communication between the manager and the employee; in another way, we can say that the head of the enterprise is not available to lower-level employees. It was also noticed that Russians have an average level of individuality and often try to get away from uncertainty.

As a result of all of the above, the conclusion suggests itself that in Russia the enterprise and the management of personnel management are formed ineffectively and there are practically no working collective ties. Enterprises devote all their attention to fulfilling the conditions set before them by employees of the state bureaucratic apparatus, and not to fulfilling responsibility to consumers and society. Therefore, there is a difficulty in introducing progressive foreign management methods into Russian practice.

In order to most successfully implement effective personnel management and prepare employees for a change in the approach to working in a team, it is first of all necessary to establish measures to encourage individuality in each employee of the enterprise and to eliminate the established inaccessibility of the leader for the lower level. It is important to create a high-quality and effective system of motivation and continuous professional development, so that personnel become a source of competitiveness of the enterprise, meet modern requirements for human resource management.

The implementation of all research results is possible only if regional and municipal branches of government actively participate in their implementation, so that, creating new jobs in small and medium-sized cities, guarantee their population all the social benefits for a decent life, ensuring their funding, including the work of preschool and school organizations, medical and cultural institutions, distracting young people from the street and other undesirable phenomena, and the appearance on demand markets of popular products with a price niche acceptable for most consumers in these regions will reduce population migration from these regions precisely at the expense of financing of all socially significant programs.

Main part

The attractiveness of the product can become a magnet that initiates the interest of the buyer. It was not for nothing that V.I. Dal interpreted attractiveness

as attractiveness, magnetism. The economic system is formed by production relations; therefore, there will be no radical transformations of the existing system of the economy, there will be a restructuring, a reboot, which changes not the system, but the order of the system's functioning, the vector evolution of economic policy. The economic system will be optimized by realizing the costs of minimizing the costs of the assortment.

Does the consumer benefit? Apparently, yes, provided that manufacturers and sellers do not skimp on research work on consumer demand. Here, the simplest research is not enough, it will require a deep analysis and integration of different approaches - economic (marketing), sociological, cultural, ergonomic, hygienic, focusing scientific research on regional, national characteristics. The prospect of real participation in the process of real-level students will open, accelerating their qualification formation

The transition from good to better in any field of activity is associated with an increase in implementation costs, including risk financing. In our view, the analyzed transition to a new economic policy should justify the expectations - it should lead to a reduction in costs, losses, environmental burden, but the result will largely be determined by the construction of scientific, technical and educational policy. Good intentions often end up with worse results due to poor management.

The time has come again to temporarily disconnect from the production of goods and, following the example of Karl Marx, focus on the cell of the modern economic organism - the commodity, but, unlike the author of "Capital", place the commodity not in production, but try to fit it into the subsystem of market relations. Capital without circulation is not capital. Capital is a process. The process of reproduction of capital is a characteristic way of its implementation. The market ensures the reproduction of capital, creating conditions for the sale of commodity products. For production, initial capital in financial form is required, for implementation, as conditions for reproduction, demand for goods is required, which the market must provide - conditions that link the producer with the consumer. Everything, as we can see, rests not even on the characteristics of the product, but on the organization of the market. Of course, the properties of the product are also important here. The doctor is able to revive the dying, but he is not able to revive the corpse. The same can be said for the market.

The transition to market-oriented production based on the structure of concretized consumption can be seen as a way to resolve the growing contradiction between growing socio-cultural needs and natural sources. And in this sense there is sufficient reason to speak about the objective completeness of the development of reproduction. The center of concentration of activity is shifting to the territory of the market, its scientific potential is being updated. Question # 1 lean production - is the market ready to increase allocations for researching the structure of the needs of the mass buyer? It is not difficult to find individual examples. At the end of June 2019, Google conducted a survey of the culinary preferences of Russians in order to make a rating of 20 basic products and the same number of dishes. The taste of Russian consumers has encouraged marketers and terrified nutritionists. Nevertheless, experts are convinced that there will be no changes in two or three years. Manufacturing, providing the grocery market received the necessary information for thinking about the directions of investment in production. Now it is important to avoid a rush of restructuring, to agree on quotas within the corresponding unions, banknotes and other associations of producers.

"Attractiveness" is being transformed from an advertising category into an economic one, more precisely, into a market brand. Theoretically and even methodologically, "Attractiveness" refers to the "cross-cutting" concepts that characterize the activity and its products. There are hardly any opponents of this statement. The essence of considering “attractiveness” in the light of our problematics is not in defining “attractiveness” as such, but in its concrete historical manifestation. Activity is a way of implementing an idea; outside of practical activity, the idea will not go beyond the element of consciousness, it remains knowledge and is likely to lose its meaning after some time. Relevance, meanwhile, is not inherent in the activity itself, but in the way of implementing the plan, while the way of implementing the activity is regulated by space-time coordinates that reveal and limit the relevance of the mode of action. History is made up of actual historical periods - actual stories. A historical phenomenon, regardless of its nature - material or ideal, becomes not when it happens, but only when it is included in the historical chain of events. In dialectics, social development is therefore described by a pair of categories "historical-logical", and historical phenomena can "drop out" from the logic of the historical process, which is natural. Otherwise, development would involuntarily make one think about the Divine creation of social history.

"Attractiveness" in a broader context has always stimulated activity. In recent history, this concept has acquired a new meaning and, accordingly, a new meaning. It found itself at the center of economic contradictions in the market. It is actively exploited in their own interests by all those for whom the market is the main source of speculation, they will go to "all the hard". Those who have retained the honor of a professional manufacturer see it as a salvation for consumers.

The concept of "product attractiveness" is partially revealed in the concept of "product value". In special literature, "product value" is defined as "a set

of quality parameters expected by the consumer for the product he needs and their values that meet the needs of the consumer." The product value unfolding is called the "customer satisfaction tree".

For the value of the product to cause consumer satisfaction, it is important not only to be concerned about the quality of the product, but also to remember that the consumer's consciousness is not a constant, it moves and matures. The expression "the client has matured" characterizes the process of interaction between the producer and the consumer. The consumer in such an interaction is represented by mental activity, first of all. The sources of mental readiness to accept the manufacturer's proposal as coinciding with their own idea of the attractiveness of the product are not uniform. Usually they include:

- manufacturer's credibility;
- information from trusted sources; consumer communication, informal communication; the presence of the product in the past experience of the buyer; the relevance of this purchase to the buyer.

If the "buyer" is considered outside the socio-economic context, then the answer to the second question looks very clear. The market is waiting for a buyer with high solvency. There are also buyers in Russia, but their share does not exceed 7 percent, and they rarely go to the lucrative market for the masses, rather by chance than by necessity. The mass consumer is extremely economical and it is difficult to "shake" it for purchase. It requires a certain type of product that can charm, and the presentation of the product, "cultural packaging". It is necessary to attract the buyer, to bewitch. Like a reflection

the desire to comprehend the specifics of the status of demand for a product on the market, one should consider the revival of interest in the concept of "product attractiveness". It is much more specific in its content in comparison with the close and more pseudo-scientific concept of "demand for a product by the market". It contains fewer economic statistics, formal signs that allow to measure pressure, but in full there is a "human factor" that determines market dynamics.

If psychologically the image of the product as attractive has formed, then relations from the phase of abstract possibility pass into real possibility. The next step - the transformation of a real opportunity into the reality of purchasing a product you like will depend on the ratio of producer and consumer costs. For the first, we are talking about the ratio of cost and price, for the second - the price and quality of the product. In all modern quality management systems in the context of regulations on prestigious awards (EFUK, UOK, IAQ, TQM, etc.), such an indicator as the degree of customer satisfaction with products stands above all others, occupying in a weight ratio from 1/5 to 1/3 cumulative points. This indicator has the least points - 180 (out of 1000) in the Regulation on the Prize of the Government of the Russian Federation in the field of quality. We understand that customer satisfaction with a product should not be limited to the consumer appeal of a product. Product attractiveness is superimposed on satisfaction, remaining part of attractiveness. There are products that initially, perhaps, did not belong to the range of attractive ones, for example, gifts or something purchased "on the occasion" by necessity. The attractiveness was discovered later, as it was used for its intended purpose. But the comparison between satisfaction and attractiveness is quite correct and indicative. Moreover, at the junction of these concepts, there is a test zone for characterizing the degree of development of production. Figure 1 shows the consumer expectation architecture.

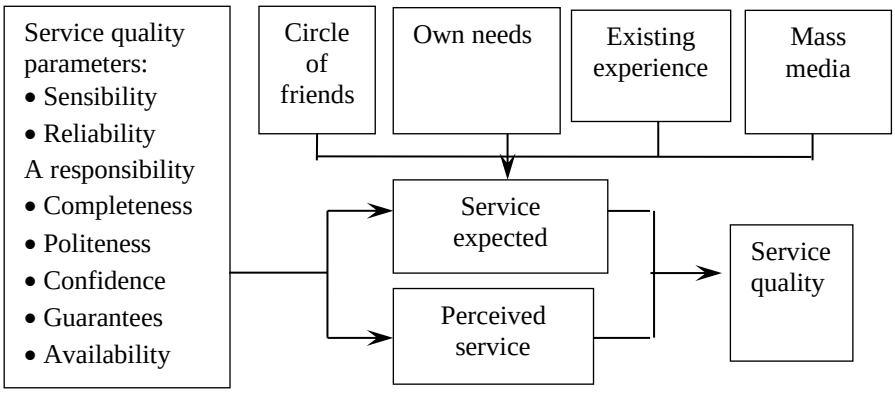

Figure 1. Architecture of consumer expectations

To study the status of the concept of "Product attractiveness", a questionnaire was developed, shown in Table 1.

Table 1-Analysis and study of the status of the concept "Attractiveness of goods"

No.	Indicators of "Product attractiveness"	Rank
1	Feeling the need to buy a product	7
2	Reliability of goods	2
3	Manufacturer's responsibility for the quality of the goods	1
4	Completeness of goods	3
5	Service courtesy	17
6	Trust in the seller, manufacturer	16
7	Impressive warranty period	4
8	Product availability	8
9	Communication with the seller	25
10	Mutual understanding with the seller, his interest in selling products	26
11	Service culture	27
12	Affordability	9
13	Customer satisfaction	10
14	The level of readiness of the consumer to make a purchase	11
15	The level of interest of the manufacturer in the formation of "Product attractiveness"	19
16	Consumer buying opportunity	12
17	Manufacturer credibility	5
18	Consumer communication	24
19	The consumer's opinion about an earlier purchase of an identical product	13
20	The need for the consumer to purchase "Attractive product"	23
21	The relevance of this purchase for the buyer	14
22	Possibility of subsequent exchange of goods	20
23	Availability of several necessary functions for the product	6
24	Modern design	22
25	Payment method for purchase	15
26	Ease of operation of the product	21
27	Organization and availability of service support for purchased goods	18

An analysis of the results of a survey of respondents on the impact of the criterion "Attractiveness of goods" confirmed the importance of the rehabilitation of this criterion in marketing activities to create sustainable demand not only for light industry products, but also for all consumer goods (Table 2).

What is interesting is the fact that is due to the coincidence of the studies performed on the formation of the architecture of customer satisfaction based on the criterion - Product attractiveness - as one of the main factors on demand and the results of a priori ranking on its impact on the sale of consumer goods, for participation in which there were students are involved in commodity studies, students are experts in the field of certification and standardization, students are technologists, constructors and designers, teachers of these specialties and graduates of the same specialties, who are currently leading specialists in enterprises engaged in the production of these very products for consumers of the regions of the Southern Federal District and the North Caucasus Federal District.

Table 2 - Results of the survey of respondents to the influence of the criterion "Attractiveness of goods" on the demand for demanded and competitive products

No. / Factors / Expert opinions	All respondents	Teachers and specialists	Students	Agreed
1	Feeling the need to buy a product	2	2	2	2
2	Reliability of goods	12	12	12	12
3	Manufacturer's responsibility for the quality of the goods	1	1	1	1
4	Completeness of goods	3	3	3	3

5	Service courtesy	21	8	21	21
6	Trust in the seller, manufacturer	8	21	8	8
7	Impressive warranty period	4	4	4	4
8	Product availability	17	6	24	17
9	Communication with the seller	24	16	17	24
10	Mutual understanding with the seller, his interest in selling products	6	17	7	6
11	Service culture	16	19	13	13
12	Affordability	7	26	5	7
13	Customer satisfaction	13	24	20	5
14	The level of readiness of the consumer to make a purchase	20	7	16	16
15	The level of interest of the manufacturer in the formation of "Product attractiveness"	5	23	6	23
16	Consumer buying opportunity	23	13	23	20
17	Manufacturer credibility	26	20	26	26
18	Consumer communication	11	5	27	14
19	The consumer's opinion about an earlier purchase of an identical product	14	11	14	11
20	The need for the consumer to purchase "Attractive product"	15	10	11	27
21	The relevance of this purchase for the buyer	27	14	15	19
22	Possibility of subsequent exchange of goods	19	15	22	15
23	Availability of several necessary functions for the product	10	18	10	10
24	Modern design	25	9	25	18
25	Payment method for purchase	22	27	18	25
26	Ease of operation of the product	18	25	19	22
27	Organization and availability of service support for purchased goods	9	22	9	9

If customer satisfaction is formed at the expense of the manufacturer's level, i.e. its test level is formed by the price availability of the product, which is offered by the assortment range, of course, by quality, and at the expense of the consumer's level, i.e. its test level assumes the presence of a culture of customer service, the attractiveness of the product, customer satisfaction, and, of course, the solvency of the consumers themselves, then the respondents who took part in the survey believe that consumer satisfaction will be ensured with the reliability of the product, its affordability, and the availability of the opportunity for buyers make purchases, i.e. their solvency. Natural quality of products, variety of assortment range, attractiveness by design decision, i.e. correspond to fashion, the products must have a sufficiently long warranty period, and, interestingly, all respondents are unanimous that manufacturers should fight for respectful attitude of buyers towards them, win their trust and desire to make a purchase of the products of these enterprises, i.e. the brand and image are always in demand, which together solves the main problem - provides consumers with domestic products within the framework of import substitution.

The criteria for assessing the competitiveness of a light industry enterprise using the software developed by the authors made it possible for the first time to formalize the role of experts - respondents on the basis of their competence to the problem under consideration. The need for such an approach is due to the desire to have an objective assessment of competence, taking into account not only the opinion of the invited party of expert respondents to participate in the survey, but also using the assessment criterion - the coefficient of concordance (W) - the value of which varies from 0 to 1. And if W = 0-0.5, then this is their lack of agreement with the opinion of those experts whose value of the coefficient of concordance (W) tends to 1, which confirms their high competence and the possibility of their further participation as expert respondents. The results of a survey of experts on assessing the competitive potential of light industry enterprises, although they received the value of the coefficient of concordance (W) in the range of 0.4-0.6, but excluding heretics, that is, those respondents whose opinion does not coincide with the opinion of most other experts, we found a pleasant fact that the opinion of those respondents whose authority is beyond doubt, and those whom the program classified as heretics, have an unambiguous or close opinion that the factors characterizing the influence of competitive potential

on the competitiveness of an enterprise are identical, and they can be used in further research in assessing this very competitiveness of enterprises, assuming that he is able to manufacture import-substituting products for consumers in the regions of the Southern Federal District and the North Caucasus Federal District. At the same time, manufacturers have all the grounds for these criteria, namely: the ratio of the quality of the product and the costs of its production and marketing; sales growth rates; costs of innovation; labor productivity; the level of partnerships with interested participants in the production of import-substituting products; costs per ruble of products sold, and the main criterion; the competitiveness of the goods weighted average for the assortment of goods should be considered in demand.

But at the same time, all the responding experts were unanimous that the company's competitiveness will be more stable over time if the company's share in the demand market is stable. In any case, it will not decrease over time if it is guaranteed a return on investment and, of course, a stable profitability of the total assets of the light industry, engaged in the production of import-substituting products, is ensured. The opinion of all experts is justified that the competitiveness of an enterprise is also influenced by a stable trade turnover on the basis of direct contractual relations with the sellers of the products of these same enterprises.

We agree with them on the issue of the role of highly qualified personnel, which of course, although it was reflected in the questionnaire in the form of one criterion - the staff turnover rate - but did not cause the experts, with regret, concern about the liquidation of lyceums, colleges, on the basis of which they trained highly qualified workers and middle managers - foremen, technicians, mechanics, technologists, engaged in servicing not only an innovative technological process, but also innovative equipment. And it is completely sad that the training of engineering and technical personnel has practically ceased, explaining all this by the lack of their demand, although the heads of enterprises themselves are at a loss. There is also a downside to this situation, namely, that managers have moved away from training these highly qualified specialists through targeted training in colleges and universities, not wanting to bear the costs of this very training, forgetting the Russian proverb: "A miser pays twice." It is also disappointing that the majority of enterprise managers believe that everything will be resolved by itself, but if a shoemaker, a seamstress-minder, a furrier can be trained in the workplace, then it is unlikely to train a leading engineer - a manager and a production organizer for filled technological processes with an effective innovative solution ...

Once again I want to recall one more Russian proverb: "That until the thunder breaks out, the man does not cross himself." Is it really necessary to step on a rake, get a tangible blow on the forehead and shout - "Ugh, I remembered the name of this tool, that this is a rake." the lightest industry, which was confirmed by the experts - respondents, showing unanimity on the main criteria for assessing the competitiveness of light industry enterprises.Summing up the analysis of the concept of "product attractiveness", its relationship with the closest economic concepts, it is methodologically expedient to arrange the relations of these concepts systematically. Table 2 shows the results of a survey of all respondents on the formation of the image of goods and its attractiveness. ensuring competitiveness and demand among consumers.

Unfortunately, the respondents, when filling out the questionnaires offered to them, did not pay due attention to communication with sellers, methods of payment for a purchase, the possibility of exchanging a purchase made if necessary: the level of service and other factors, and only because our consumer is not spoiled by all this list of services service, both the manufacturer and the trade still have a lot of opportunities for improvement in interaction with consumers in order to guarantee themselves a steady demand.

Thus, the criteria "Product attractiveness" has the right to life and are more significant for both the manufacturer and the buyer to ensure sustainable demand for products manufactured in the regions of the Southern Federal District and the North Caucasus Federal District, and this is the most important and dominant wish for meeting needs, which consumers of these regions would like to sell.

The 21st century has sharpened the scientific, philosophical and practical interest in competition by improving the quality of manufactured products. The scale, content, forms and significance of competition put it in a number of global problems of human development with one important clarification: it is not humanity itself that benefits from achievements in the competitive struggle, but individual subjects of human activity, starting with the personality of the performer and the head of the enterprise, and up to those states in whose interests they work. Therefore, the organization of effective participation in competition should be considered as a leading indicator of professional competence, spiritual maturity and political consciousness, bearing in mind, of course, economic policy. We all wish ourselves and our neighbors success in life, and we associate this with happiness. We explain this condition more often - by external factors: luck, luck, support. Less often - internal - personal qualities.

Judging by the interest in different types of testing, expert assessments, the question generally remains open: what determines success in life?

Often, subconsciously, we feel our inefficiency, but, not understanding the origins, we react to it in different ways: some with even greater frenzy pounce

on disgusting work, others, with no less zeal, begin to conflict with others, blaming them for their failures. Success is usually associated with the fact that the more you produce, the more you do, the higher your efficiency, your success. They are very often confused (and sometimes even deliberately) with performance, forgetting or not knowing that the result will be effective if it is not measured against costs.

Production, thoughts and things with a positive interaction of man with the world obey the general law of Nature: existence is possible only under the condition: the arrival of energy must be greater than its consumption. True efficiency is a function of its two constituent elements: the achieved result (P), as well as the resources and means (PC) that allow it to be obtained: remember the fable about the peasant and the goose laying the golden eggs .... Efficiency lies in the balance of its components, ie "P / PC = MEASURE". Indeed, if you adopt a behavior that focuses only on the golden eggs and neglects the goose, then you will soon be left without the resources that produce these golden eggs. On the other hand, if you only care about the goose, forgetting about the golden eggs, then soon you will not be able to feed yourself and the goose.

So, the effectiveness of the activity lies in the proportionality of the result with resources and means: "R / PC = MEASURE".

The resource of an enterprising person is the whole world around him, but first of all he himself.

A person's personal resources are in his mind and character, in the skills and abilities of interacting with the world.

There is a Pareto rule: 20/80. If you try to use it in our case, you get the following. In relation to an individual, this is: 20% of actions and thoughts give 80% of a positive result. It is striking the persistence with which a person, having been unsatisfied with the result for decades, repeats monotonous actions, but at the same time he never once has the thought: “I’m doing something wrong !? Or - is there something wrong !? " It is very easy for a person to get used to doing stupid, hard physical or monotonous intellectual work and it is very difficult for him to look at himself through the eyes of a researcher, through the eyes of a Master.

They say: "they change a person - situations", but only the Master in them deeply experiences what is happening, is their active participant. The situation for the Master is filled not only with novelty, but also with meaning, in it he finds differences, changes, points of growth. He sees his goal in her. The problem evokes in him a sense of rivalry, a sense of readiness and mobilizes all his forces, which, with such a mood, only multiply with each positive decision. We learn from mistakes, but he has no mistakes, there is only experience, positive experience.

It is the Masters who make up those 20% of people who account for 80% of success. And therefore, our eternal problem looks like a dilemma: either you become a Master, or all your life you chase in the "collective" of an eighty percent crowd after the ghost of twenty percent success. And the question is justified, will we become the master of our destiny with the inner resource of the Master?

The strategies and behaviors developed can be assessed as productive or unproductive, depending on their relevance to the situation: recall the tale of a fool, a man and a goose that lays the golden eggs.

The technical term for thinking styles is query modes. Query Modes represent a basic set of targeted worldview techniques. They are built on previously acquired preferences, learned values and views of the world - concepts of the world and the nature of reality, which relate to the map as a system of landmarks used when moving.

To succeed in learning, you just need to start working with the material, try it without any prejudice, and consolidate its assimilation with appropriate exercises.

In any “masterful” skill or action, we can find a certain “strategy”. His Master strategy includes a series of thoughts and actions that lead relentlessly to success.

Cherished goals serve as a measure of success. Choosing and achieving goals (these include dreams, hopes, desires and specific goals) can be considered the most important components of human experience. In addition to the satisfaction of success achieved, choosing the right goal can literally change our lives. Usually the desired is achieved through personal qualities. It is personalities that turn clear goals into motivation, self-confidence, perseverance and other human qualities that steadily lead to success. Ambition is undoubtedly considered one of these qualities.

The activity of imagination and the development of will, undoubtedly, is of much greater benefit than overtime work.

Behavior has a purpose, because it must lead to a particular result, and we interpret our actions as aimed at a certain outcome. We ourselves attach importance to them, although sometimes we do it only afterwards, “in hindsight”.

Even in cases where we act without realizing, we still have a fundamental motivation - an unspoken goal.

Consciously and accurately formulating your own goals, that is, a "well-defined outcome", increases the chances of transforming our desires into appropriate actions on the path to success.

Let us analyze this in the context of the general movement towards perfection, namely:

1. Decide what you want (formulate and set a goal for yourself).
2. Do something.
3. See what happens.

4. If necessary, change the approach until you achieve what you want.

Setting the right goals means being able to "correctly formulate the result."

The main principles of the formation and selection of their goals are:

1. Selecting goals that deserve to be achieved.
2. Choosing a goal that you can achieve on your own.
3. State your goal in affirmative terms.
4. Express your goal accurately, in sensory categories.
5. Match your goal with the situation.
6. Soberly assess the consequences of achieving your goal.

Perhaps we began to understand that if we want to change something, then we must start the change with ourselves. And in order to change ourselves effectively, we must first of all change our perception.

The need to tighten responsibility for the quality of import-substituted products is confirmed by the results of checking this very quality by Ros quality specialists. In their opinion, the quality of products does not depend on their price, it is only necessary to strictly comply with the requirements of GOSTs and technical regulations during their production, increasing the level of responsibility of enterprise managers for the results of their work and the level of individual responsibility of performers employed in workplaces in the digital production of import-substituting products.

The experience of applying statistical methods of quality control using the Pareto diagram at machine-building enterprises in the regions of the Southern Federal District and the North Caucasus Federal District are presented below in the form of research results

The modern market economy imposes fundamentally new requirements for the quality of products. Quality management is one of the key functions of both corporate and project management, the main means of achieving and maintaining the competitiveness of any enterprise. The key task of the management of companies is the creation, practical implementation and subsequent certification of the quality management system (a modern term that replaced the previously used term - "quality management systems"), and the products supplied for a certain period of time (contract validity, release date for this type of product, etc.) etc.). Quality management is, in essence, a cross-cutting aspect of the enterprise management system - similar to such as time, costs, personnel management.

Quality is formed in the production process, therefore, the main factor in ensuring quality and one of the decisive elements of ensuring the competitiveness of an enterprise is the quality management system operating at the enterprise.

The reason for the development of the QMS is the awareness of the new realities of the market. Now the presence of a certified QMS is practically becoming a necessity: this is a mandatory requirement of some customers when concluding contracts, this is a mandatory requirement for participation in most tenders. Voluntary certification of the QMS is gradually becoming a necessity for manufacturers, in fact becoming mandatory. That is why QMS is one of the stages in the development of every modern enterprise. When developing a QMS, it is necessary to coordinate management activities in relation to quality, thereby strengthening the relationship of all structural divisions.

The quality of products, their technical level is assessed by comparing the technical and economic indicators of products with the best domestic and foreign samples, as well as with products of competing organizations. In this case, the assessment is carried out according to the main indicators characterizing the most important properties of the products.

The manufacture of rejected products leads to a decrease in the amount for manufactured and sold products, to an increase in the cost of production, to a decrease in profits and profitability.

In the process of analysis, the dynamics of marriage is studied in terms of the absolute amount and share in the total output of marketable products; losses from marriage are determined. Then the reasons for the decrease in the quality and admitted defects of products are studied by the places of their occurrence and the centers of responsibility, and measures are developed to eliminate them.

In the production process of any product, it is impossible to obtain all products of the same quality, that is, the parameters of various units of products fluctuate within certain limits. This fluctuation is caused by a complex of random and systematic reasons that operate in the production process and determine the errors of this technological process. If the fluctuation of the parameters is within the permissible limits (within the tolerance), then the product is suitable, but if it goes beyond these limits - the rejects, which are either disposed of or restored and re-sold.

In modern conditions of aggravation of competition, its transformation into a global basis for the survival and success of an enterprise, the basis of a stable position of an enterprise in the market is a timely offer of products that meet the world level of quality. At the same time, the competitiveness of any enterprise, regardless of size, form of ownership and other features, depends primarily on the quality of the product and the commensurability of its price with the offered quality, i.e. on the extent to which the company's products meet the needs of the consumer.

These circumstances lead to a natural growth of the role of the quality management system of the

enterprise as a universal tool for increasing the competitiveness of the enterprise, allowing to achieve the goal of reducing the cost of manufactured products with absolute satisfaction of consumer requirements.

The most widespread organizational and methodological basis in the world for creating quality management systems for enterprises is the international standards ISO 9000 series. Creation of a quality system based on these standards allows an enterprise to move from product quality management to quality management of the entire enterprise.

Within the framework of the quality system, the economic aspect is also implemented - taking into account the relationship between product quality and the results of the economic activity of an enterprise through taking into account its costs for quality assurance and comparing them with losses associated with the release of low-quality products.

The crisis state of the domestic economy determines the exceptional urgency of the problem of creating quality management systems at Russian enterprises in order to ensure the competitiveness of enterprises. For the majority of enterprises in our country, a situation is typical when the non-competitiveness of products in terms of quality is aggravated by the non-competitiveness in terms of price due to the excessive cost of production. Therefore, one of the prerequisites for bringing the Russian economy out of the crisis is the introduction of effective quality management systems capable of ensuring the competitiveness of the manufactured product in terms of price and quality.

Thus, in order to increase the competitiveness of enterprises, the problem of creating quality systems should be solved both at the level of individual enterprises and at the state level. Among the measures designed to stimulate enterprises to introduce quality management systems, the establishment in 1996 of the annual Prize of the Government of the Russian Federation in the field of quality, as well as the adoption by the Government in 1998 of a resolution "On some measures aimed at improving systems for ensuring the quality of products and services" ...

However, the task of creating an efficiently functioning quality management system should be solved, first of all, at the level of a particular enterprise, taking into account its characteristics determined by the field of activity, the current financial state, the existing level of implementation of consistency in work on quality assurance, etc.

At present, the number of enterprises implementing a quality management system based on the ISO 9000 series standards has sharply increased, which is facilitated by a number of circumstances, the main of which are:

organization of work on the implementation of quality systems is an important element of several federal programs;⁎

when creating joint ventures, foreign firms and companies often set a prerequisite: preparation and operation of a quality system in accordance with the ISO 9000 series standards;⁎

⁎ enterprises of various industries seeking to export products are faced with the problem of introducing ISO standards and certification of quality systems for compliance with these standards during contract negotiations, and also in a number of countries it becomes difficult to sell products without confirming the stability of quality during their release;

creation of more favorable conditions for insurance, obtaining a loan, investment, participation in tenders, competitions and other events that may end with a contract; ⁎

the executive discipline at the enterprise is increased, the motivation of employees is improved, the losses that were provoked by defects and inconsistencies are reduced;⁎

the enterprise becomes more "transparent" for management, in this regard, the quality of management decisions increases;⁎

A number of problems that the company faces on the way to create a quality management system, namely:

⁎the specialists of our enterprises have no real experience of work in the conditions of market relations. During the certification of quality systems, the lack of such experience is observed in many forms, namely: in the inability to establish effective feedback with consumers; lack of skills in the assessment and selection of suppliers; in an unclear distribution of responsibility between managers of different levels; in duplication of some processes, etc .;

⁎Taking managerial decisions on the implementation of quality assurance measures, the heads of enterprises pursue the goal of not creating an efficiently functioning quality system, which will actually guarantee the quality of products in accordance with the needs and expectations of consumers, namely, obtaining a certificate, certificate. The external market for domestic enterprises that do not have a quality system based on the ISO 9000 series is practically closed. Therefore, the administration of enterprises is primarily interested in the timing of obtaining an international certificate of quality. And issues related to the volume of labor, material, technical and financial resources required for the implementation and certification of the quality system and, most importantly, to ensure its cost-effective operation, fade into the background;

⁎ the appointment of specialists for the development and implementation of quality management systems according to the international quality management system by the management of an enterprise is often carried out without proper selection of candidates and understanding of the criteria that these candidates must satisfy.

Despite the many reasons that make the work of introducing an international system based on the

international standards ISO 9000 series in domestic enterprises by no means easy, many enterprises have quite consciously embarked on this path. In the process of purposeful work to improve their quality management systems, they have made tangible changes for the better, strengthened their position among competitors and now set themselves more challenging goals. Increasing the competitiveness of an enterprise through the implementation and improvement of the quality management system is a problem that requires an integrated approach, covering not only the production process of products, but also its implementation and after-sales service.

In September 2015, the international standard ISO 9001: 2015 came into force. Russian version of GOST R ISO 9001-2015 “Quality management systems. Requirements "entered into force on November 01, 2015.

In the new version of the GOST R ISO 9001-2015 standard, relative to the previous one, significant changesin particular, the structure of the standard has changed. The new version of the standard now contains 10 sections instead of 9.

The updated version of GOST R ISO 9001-2015 includes the following sections:

0. Introduction.

This section of the GOST R ISO 9001-2015 standard provides general provisions on the quality management system, quality management principles and the process approach.

1 area of use.

This section establishes the scope of the GOST R ISO 9001-2015 standard. As in the previous version of the GOST ISO 9001-2011 standard, the section establishes uniform requirements for quality management systems of an enterprise, regardless of size and areas of activity. The GOST R ISO 9001-2015 standard can be applied:

⁕ when an enterprise wants to demonstrate the ability to manufacture products or provide services that meet customer requirements;

⁕ for the purpose of increasing customer satisfaction.

2. Normative references.

This section of the GOST R ISO 9001-2015 standard provides links to interrelated standards.

3. Terms and definitions.

The terms and definitions used in GOST R ISO 9001-2015 are given in the new version of GOST R ISO 9000-2015.

4. The environment of the enterprise.

This section of GOST R ISO 9001-2015 establishes requirements for:

⁕ identification of internal and external conditions of the enterprise, affecting the quality management system and the results of the enterprise;

⁕ identification of interested parties influencing the QMS and determining the requirements of interested parties, monitoring these requirements;

⁕ defining the scope of the quality management system, which should be documented;

⁕to the definition and management of QMS processes. Opportunities and risks should also be identified for each QMS process.

5. Leadership.

This section of GOST R ISO 9001-2015 establishes requirements for:

⁕ top management, which should take a leading role in the implementation and management of the QMS;

⁕ quality policy;

⁕ top management, which must define responsibility, authority and assign roles at the enterprise for the functioning of the QMS and the implementation of customer requirements.

6. Planning.

This section of GOST R ISO 9001-2015 establishes requirements for:

⁕identification of risks and opportunities that can affect the QMS and the achievement of the enterprise's planned results. Requirements are established for developing a response plan for risks and opportunities;

⁕ defining quality objectives and planning the achievement of quality objectives;

⁕ planning changes to the QMS.

7. Provision

This section of GOST R ISO 9001-2015 establishes requirements for:

⁕ management of resources, infrastructure, personnel, knowledge, production environment, as well as tools for monitoring and measuring;

⁕ requirements for the competence of personnel;

⁕ awareness of personnel on QMS issues;

⁕ the definition of external and internal interactions affecting the QMS of the enterprise;

⁕ documentation (creation, updating, management of documented information).

8. Processes.

This section of GOST R ISO 9001-2015 establishes requirements for:

⁕ planning and management of QMS processes;

⁕ defining requirements for products and services;

⁕ development and design of products and services;

⁕ management of external support for products and services;

⁕ preservation of products and services;

⁕ production of products and services;

⁕ management of nonconforming products, services, processes.

9. Conducting an assessment.

This section of GOST R ISO 9001-2015 establishes requirements for:

⁕monitoring, measurements, analysis and assessment of the QMS and the activities of the

enterprise. Also specifies requirements for measuring customer satisfaction;

⁎ to conduct internal audits of the QMS;

⁎ conducting an analysis of the enterprise's QMS by the top management.

10. Improvements

This section of GOST R ISO 9001-2015 establishes requirements for:

⁎ making improvements in products, services and processes, as well as the company's QMS.

⁎ actions upon detection of non-conformities, taking corrective actions;

⁎ continuous improvement of the QMS and the results of the enterprise.

The new structure of the standard is reflected in the schematic representation of the process approach. The process approach diagram reflects the relationship of all clauses of the standard, as shown in Figure 2.

The key changes in the new version of the standard are the requirements for risk assessment, as well as a risk management approach in the design and development of a quality management system.

Figure 2. - Scheme of the process approach

The International Accreditation Forum (IAF) has approved a three-year transition period from mandatory ISO 9001: 2008 (GOST R ISO 9001-2011) to ISO 9001: 2015 (GOST R ISO 9001-2015). During this period, both standards and certificates of conformity issued to the enterprise by certification bodies will be in force. Certificates issued for compliance with ISO 9001: 2008 ceased to be valid only in September 2018.

Among the statistical methods of quality control, the most common both today and tomorrow, the so-called seven quality control tools :

⁎Pareto chart;

⁎Ishikawa's causal diagram;

⁎control card;

⁎bar graph;

⁎scatter chart;

⁎stratification method;

⁎checklists.

Taken together, these methods form an effective system of methods for quality control and analysis. Seven simple methods can be applied in any sequence, in any combination, in various analytical situations, they can be considered both as an integral system and as separate analysis tools. In each specific case, it is proposed to determine the composition and structure of the working set of methods.

The Pareto chart allows you to visualize the amount of loss of defects depending on various objects; it is a kind of a bar chart used to visualize the factors under consideration in decreasing order of their importance.

The construction of a Pareto chart begins with the classification of emerging problems according to individual factors (for example, problems related to marriage; problems related to the operation of equipment or performers, etc.) Then the collection and analysis of statistical material for each factor follows in order to find out which ones. of these factors are prevalent in solving problems.

With regard to the construction and use of a Pareto chart, the following can be recommended: it is

desirable to use different classifications and make many Pareto charts. The essence of the problem can be grasped by observing the phenomenon from different points of view, so it is important to try different ways of classifying data until a few essential factors are identified, which, in fact, is the purpose of Pareto analysis; the group of factors "other" should not constitute a large percentage. A large percentage of this group indicates that the objects of observation are classified incorrectly and too many objects fall into one group, which means that a different classification principle should be used; if the data can be represented in monetary terms, it is best to show this on the vertical axes of the Pareto chart. If the existing problem cannot be estimated in monetary terms, the research itself may be ineffective, since costs are an important measurement criterion in management;

if an undesirable factor can be eliminated with a simple solution, this must be done immediately, no matter how insignificant it may be... Since the Pareto chart is regarded as an effective means of solving problems, only a few, essential reasons should be considered. However, the elimination of a relatively unimportant cause in a simple way can serve as an example of an effective solution to the problem, and the gained experience, information and moral satisfaction can have a beneficial effect on the further procedure for solving problems; Opportunities to draw up a Pareto chart should not be missed for reasons.

In a rectangular coordinate system, equal segments corresponding to the factors under consideration are laid along the abscissa axis, and the value of their contribution to the problem being solved along the ordinate axis. In this case, the order of the factors is such that the influence of each subsequent factor located on the abscissa decreases in comparison with the previous factor (or a group of factors). The result is a chart with bars that correspond to the individual factors that are causing the problem, and the height of the bars decreases from left to right. Then a cumulative curve is constructed based on this diagram.

Building a Pareto chart in Excel consists of the following steps.

Suppose we have product sales data shown in the table (Figure 3):

	A	B
1	**Товар**	**Прибыль, млн. руб.**
2	Хлеб	962
3	Крупа	115
4	Овощи	190
5	Фрукты	226
6	Сахар	132
7	Мясо	537
8	Рыба	764
9	Молоко	157
10	Яйца	278
11	Масло	96

Figure 3. - Product sales data

The data in the table (Figure 3) is not ordered, therefore, first of all, let's sort the data in descending order of profit To do this, select the table (Figure 4) and select Data -> Sort and Filter -> Sort in the tab bar:

Additionally, we added several columns to the table (Figure 4) (Figure 5):

Increasing percentage of profit,%- each product is summed up with the previous one and the total share in the profit is shown; Efficiency ratio - in this case 80% (according to the Pareto rule);

Backlight criterion - in the final diagram, the main sources of profit will be highlighted, we indicate a value obviously greater than 1.

To build a Pareto chart, the initial data are presented in the form of a table, in the first column of which the analyzed factors are indicated, in the second - absolute data characterizing the number of cases of detection of the analyzed factors in the period under consideration, in the third - the total number of factors by type, in the fourth - their percentage , in the fifth - the cumulative (accumulated) percentage of cases of detection of factors.

"Other factors" are always placed last on the ordinate; if the share of these factors is relatively large, then it is necessary to decipher them, highlighting the most significant ones. Based on these, the initial data, a bar chart is built (Figure 1.5), and then, using the data in column 5 and an additional ordinate denoting the cumulative percentage, a Lorentz curve is drawn. It is possible to build a Pareto diagram when the data of columns 4 are laid on the

main ordinate; in this case, to plot the Lorentz curve, there is no need to include an additional ordinate in the diagram.

	A	B	C	D	E
1	**Товар**	**Прибыль, млн. руб.**	**Нарастающий процент прибыли, %**	**Коэффициент**	**Подсветка**
2	Хлеб	962	27,8%	80%	200%
3	Рыба	764	49,9%	80%	200%
4	Мясо	537	65,5%	80%	200%
5	Яйца	278	73,5%	80%	200%
6	Фрукты	226	80,0%	80%	0%
7	Овощи	190	85,5%	80%	0%
8	Молоко	157	90,1%	80%	0%
9	Сахар	132	93,9%	80%	0%
10	Крупа	115	97,2%	80%	0%
11	Масло	96	100,0%	80%	0%

Figure 4. - Data on sales of products with the addition of columns

	A	B	C	D	E
1	**Товар**	**Прибыль, млн. руб.**	**Нарастающий процент прибыли, %**	**Коэффициент**	**Подсветка**
2	Хлеб	962	=СУММ($B$2:B2)/СУММ($B$2:$B$11)	0,8	=ЕСЛИ(C2<D2;2;0)
3	Рыба	764	=СУММ($B$2:B3)/СУММ($B$2:$B$11)	=D2	=ЕСЛИ(C3<D3;2;0)
4	Мясо	537	=СУММ($B$2:B4)/СУММ($B$2:$B$11)	=D3	=ЕСЛИ(C4<D4;2;0)
5	Яйца	278	=СУММ($B$2:B5)/СУММ($B$2:$B$11)	=D4	=ЕСЛИ(C5<D5;2;0)
6	Фрукты	226	=СУММ($B$2:B6)/СУММ($B$2:$B$11)	=D5	=ЕСЛИ(C6<D6;2;0)
7	Овощи	190	=СУММ($B$2:B7)/СУММ($B$2:$B$11)	=D6	=ЕСЛИ(C7<D7;2;0)
8	Молоко	157	=СУММ($B$2:B8)/СУММ($B$2:$B$11)	=D7	=ЕСЛИ(C8<D8;2;0)
9	Сахар	132	=СУММ($B$2:B9)/СУММ($B$2:$B$11)	=D8	=ЕСЛИ(C9<D9;2;0)
10	Крупа	115	=СУММ($B$2:B10)/СУММ($B$2:$B$11)	=D9	=ЕСЛИ(C10<D10;2;0)
11	Масло	96	=СУММ($B$2:B11)/СУММ($B$2:$B$11)	=D10	=ЕСЛИ(C11<D11;2;0)

Figure 5. Deciphering the formulas of the auxiliary table (Figure 4)

To build a Pareto chart, the initial data are presented in the form of a table, in the first column of which the analyzed factors are indicated, in the second - absolute data characterizing the number of cases of detection of the analyzed factors in the period under consideration, in the third - the total number of factors by type, in the fourth - their percentage , in the fifth - the cumulative (accumulated) percentage of cases of detection of factors.

"Other factors" are always placed last on the ordinate; if the share of these factors is relatively large, then it is necessary to decipher them, highlighting the most significant ones. Based on these, the initial data, a bar graph is built (Figure 6), and then, using the data in column 5 and an additional ordinate denoting the cumulative percentage, a Lorentz curve is drawn. It is possible to build a Pareto diagram when the data of columns 4 are laid on the main ordinate; in this case, to plot the Lorentz curve, there is no need to include an additional ordinate in the diagram.

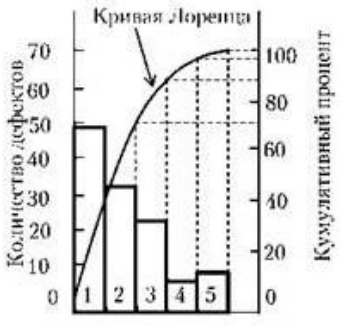

Figure 6. Pareto chart

To solve all kinds of problems associated with the appearance of defects, equipment malfunctions, an increase in the time from the release of a batch of products to its sale, the presence of unsold products in the warehouse, the receipt of complaints, the Pareto chart is used (Figures 7 and 8).

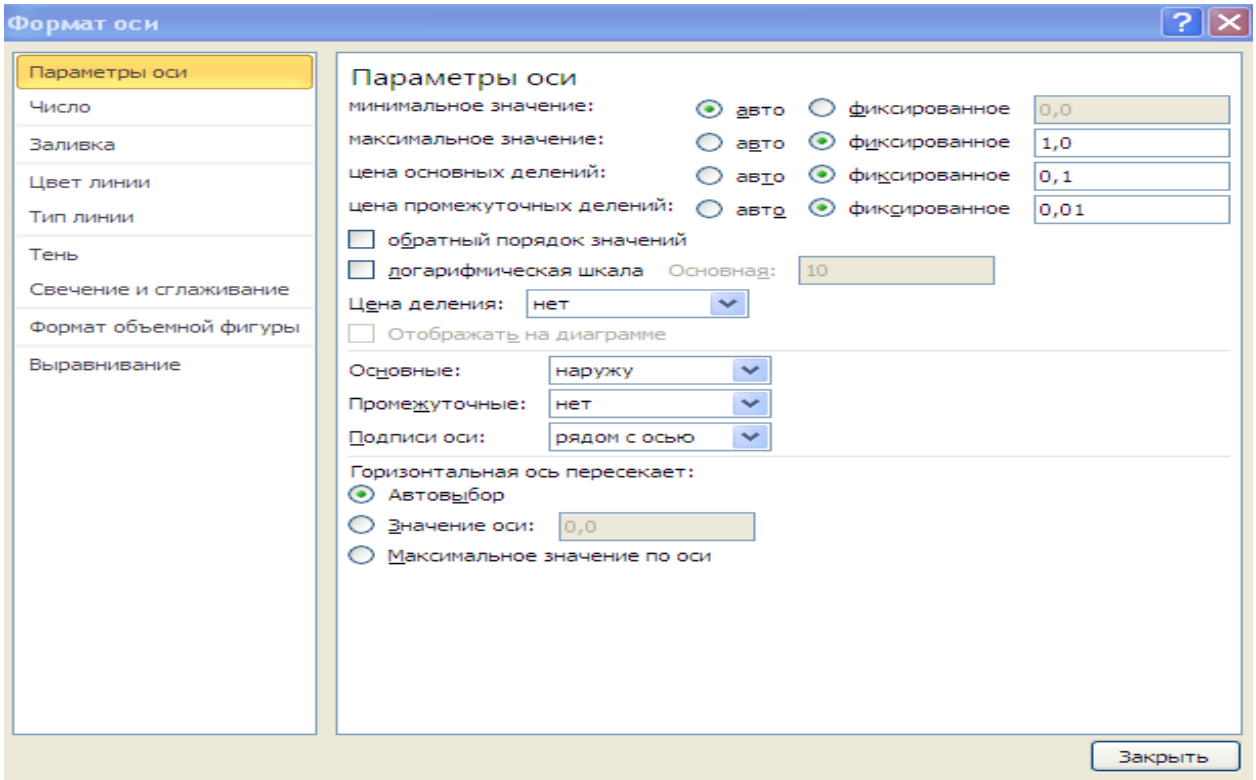

Figure 7. Window for building a Pareto chart in Excel

Defect	Number of defects	Accumulated share of defects	Cumulative percentage
knotting	96	12	12%
span	94	13	25%
hood	85	eleven	36%
white	84	eleven	47%
massive cliff	72	nine	56%
"Sliding" warp threads	69	nine	65%
"Prickly" surface	58	7	72%
oil stains	56	eight	80%
knots	53	6	86%
overshoot	41	6	92%
edge flaking	39	5	97%
others	25	3	100%
total	772		

Figure 8. Initial data for building a Pareto chart in Excel

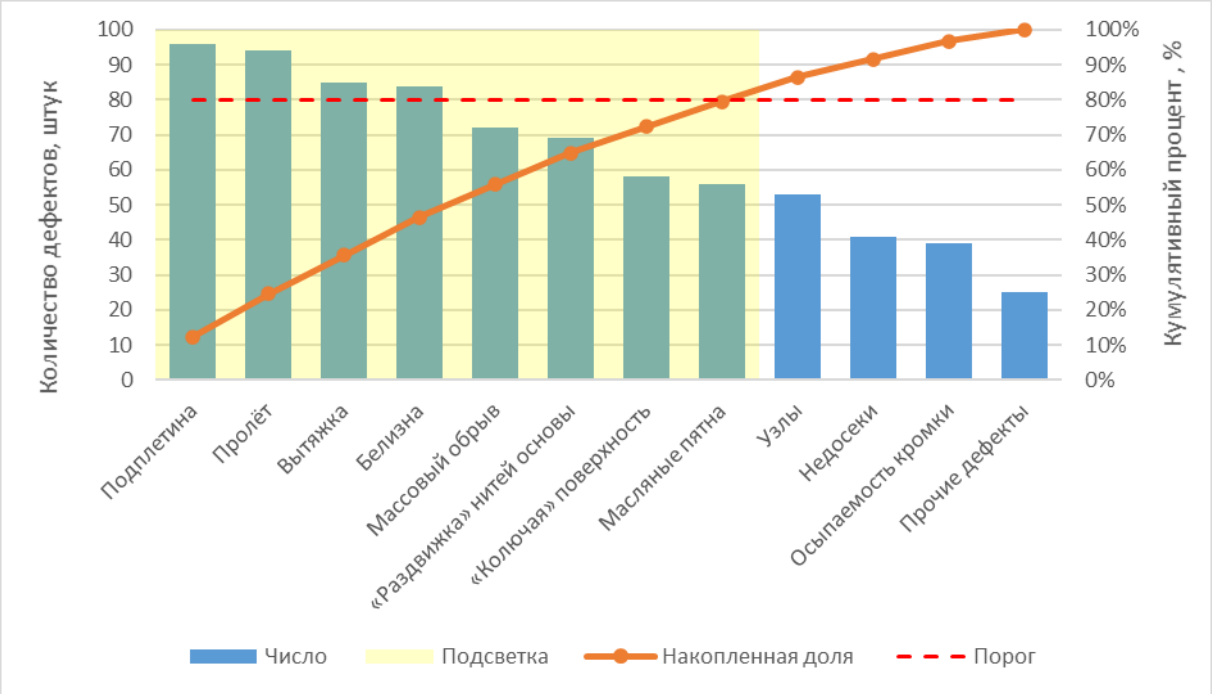

Figure 9. - An example of building a Pareto chart for identified defectsSelect all the data (Figure 3) and insert it into the histogram. To do this, go to the tab bar on Insert -> Chart -> Histogram -> Histogram with grouping (Figure 10):

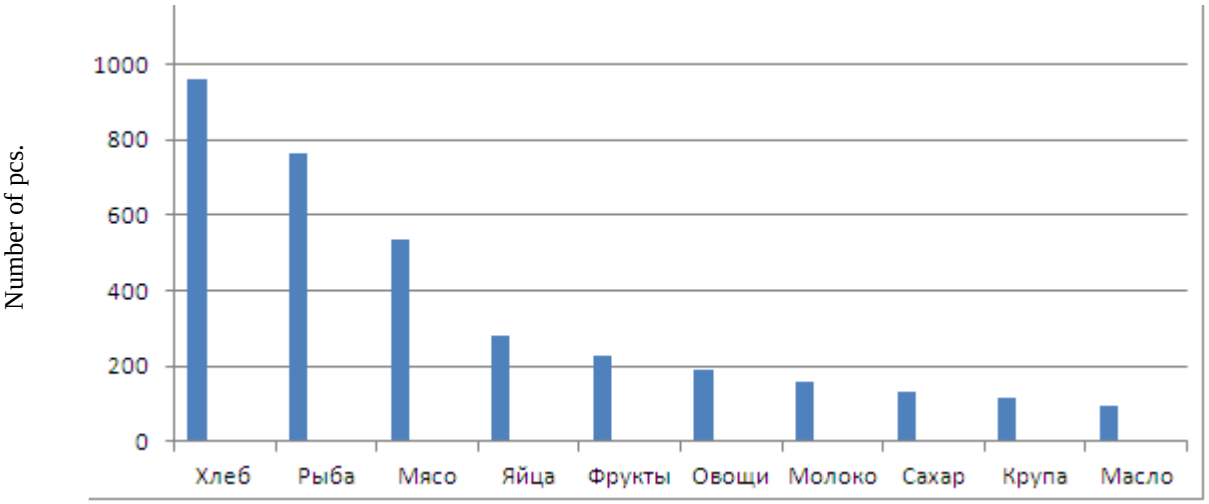

Figure 10. - Building a histogram

Now let's transform the chart into a more convenient view. Select the row "Increasing percentage of profit,%" and transfer it to the secondary axis (right-click on the row, select Format data series -> Row parameters -> Along the secondary axis) (Figure 11):

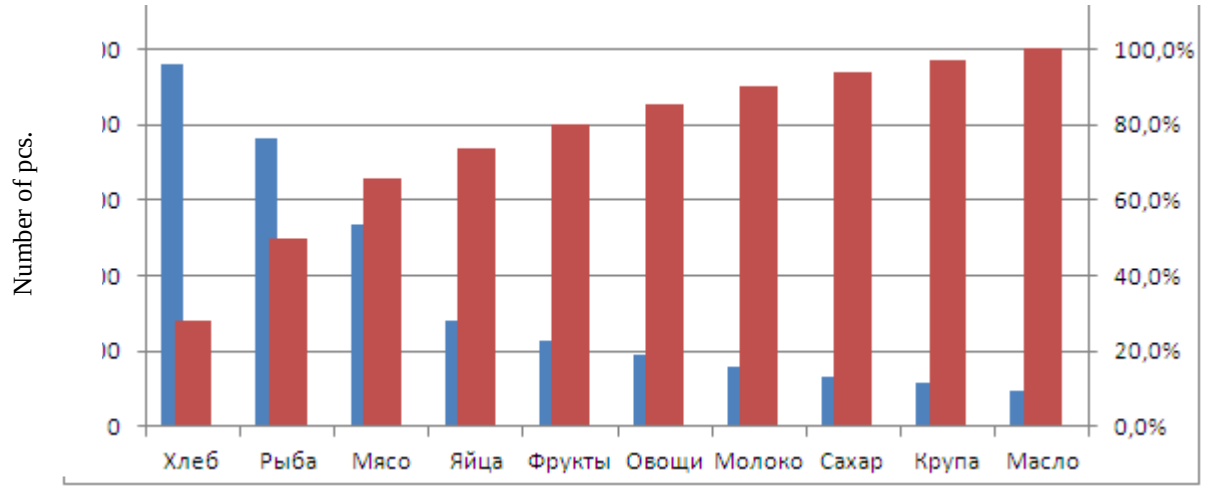

Figure 11. - Transferring the row to the auxiliary axis

We will also change the chart type for this series to a regular line chart (right-click on the series, select Change chart type for the series) (Figure 12):

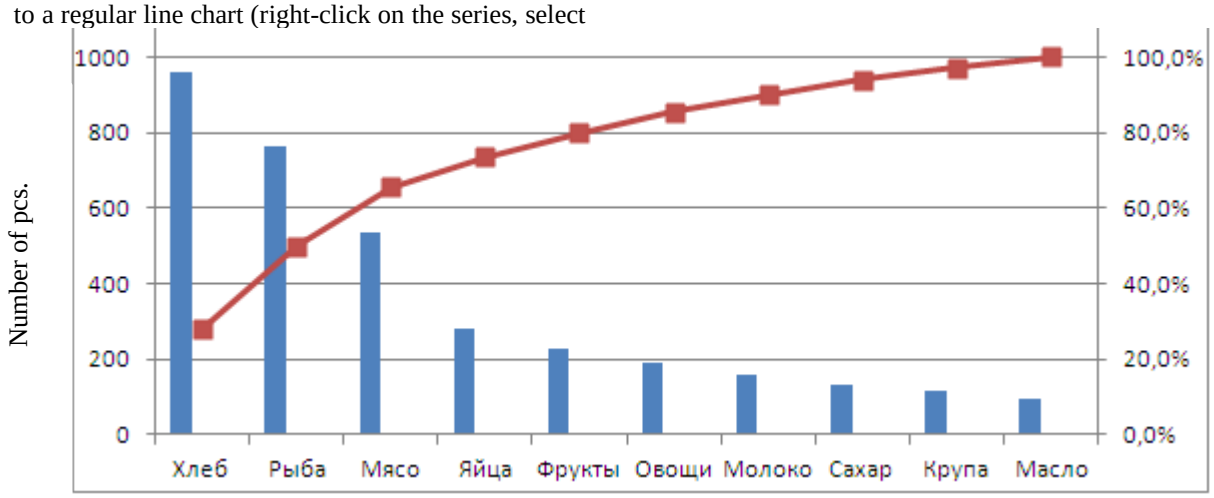

Figure 12. - Changing the type of chart for a series

Further, we carry out similar actions for the "Coefficient" row, which we transfer to the auxiliary axis and make it a horizontal line (Figure 13):

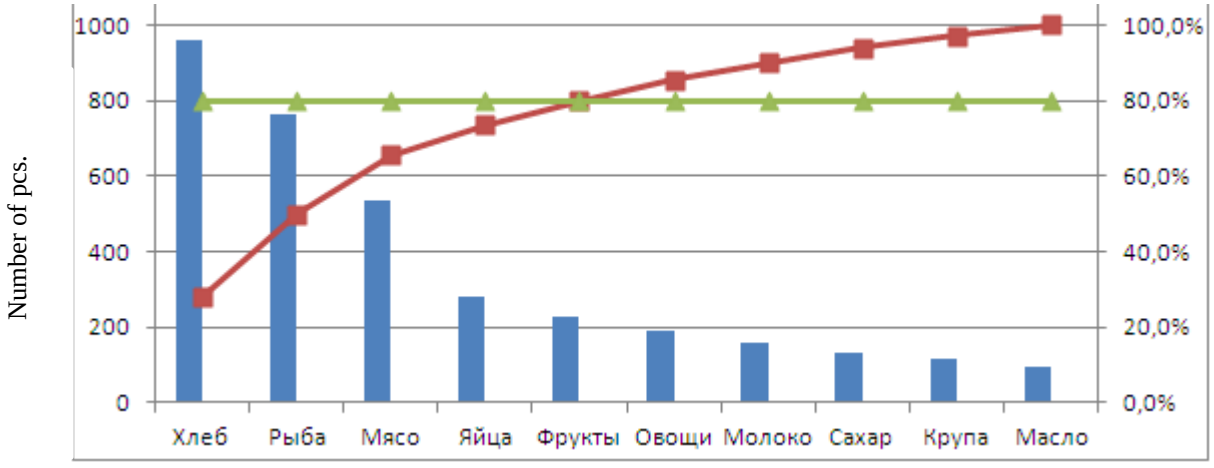

Figure 13. - Adding a horizontal line to the diagram

Let's add highlighting to the chart that shows which specific product groups bring the main profit. Select the "Highlight" row and transfer it to the secondary axis. Set the side gap to 0 - right-click on the row, select Format data series -> Row parameters -> Side gap (Figure 14):

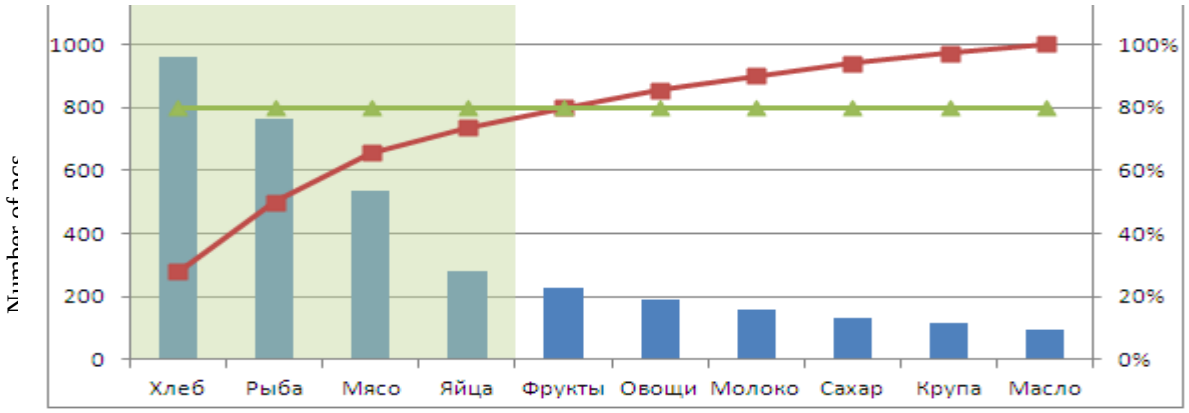

Figure 14. - An example of a Pareto chart in Excel for product sales data (Figure 4)

We customize the chart at our discretion and get the final look of the Pareto chart in Excel (Figure 1.14):

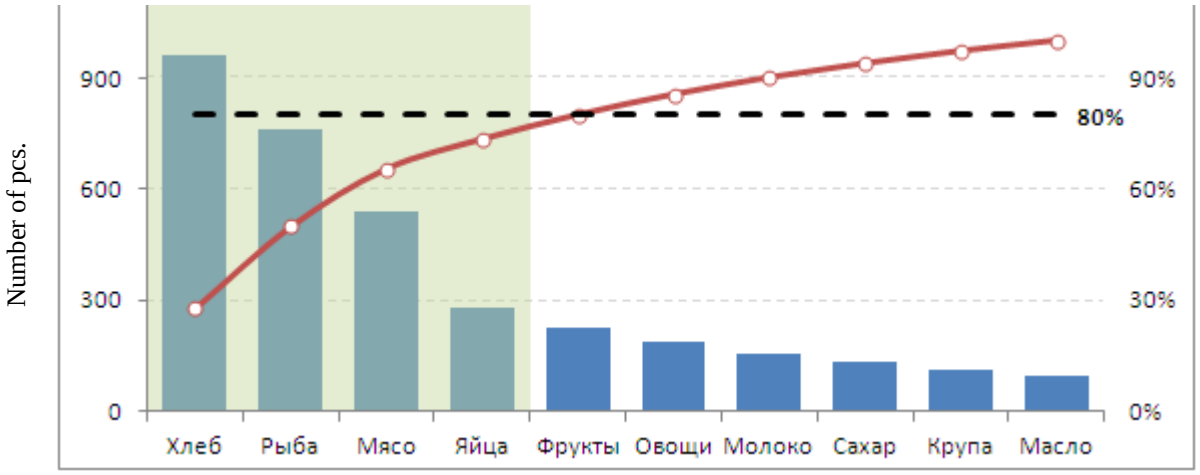

Figure 15. - The final view of the Pareto chart in Excel (wrong)

If Figures 12 and 13 are constructed correctly and the condition for the formation of the cumulative percentage is satisfied, the total value of which cannot be more than 100%, and the scaling must be implemented in accordance with the rules for the design of charts, namely: the scale of the right ordinate is set to 10% and the axis is divided like this way, there are always only ten parts, which provokes the formation of the left ordinate axis, namely, choosing the scale ratio between the left and right ordinate axes 1: 1; 1: 2; 15; 1: 10; or 1: 1; 2: 1; 5: 1; 10: 1; then Figures 15 and 16 are incorrectly constructed.

The Pareto chart allows you to distribute efforts to resolve emerging problems and establish the main factors with which you need to start to act in order to overcome the problems that arise.

Further, we carry out similar actions for the "Coefficient" series, which we transfer to the auxiliary axis, and make it a horizontal line:

We customize the chart at our discretion and get the final look of the Pareto chart in Excel (Figure 16), but the plotted incorrectly - the ordinate axis has the designation 120%, and it should be no more than 100%

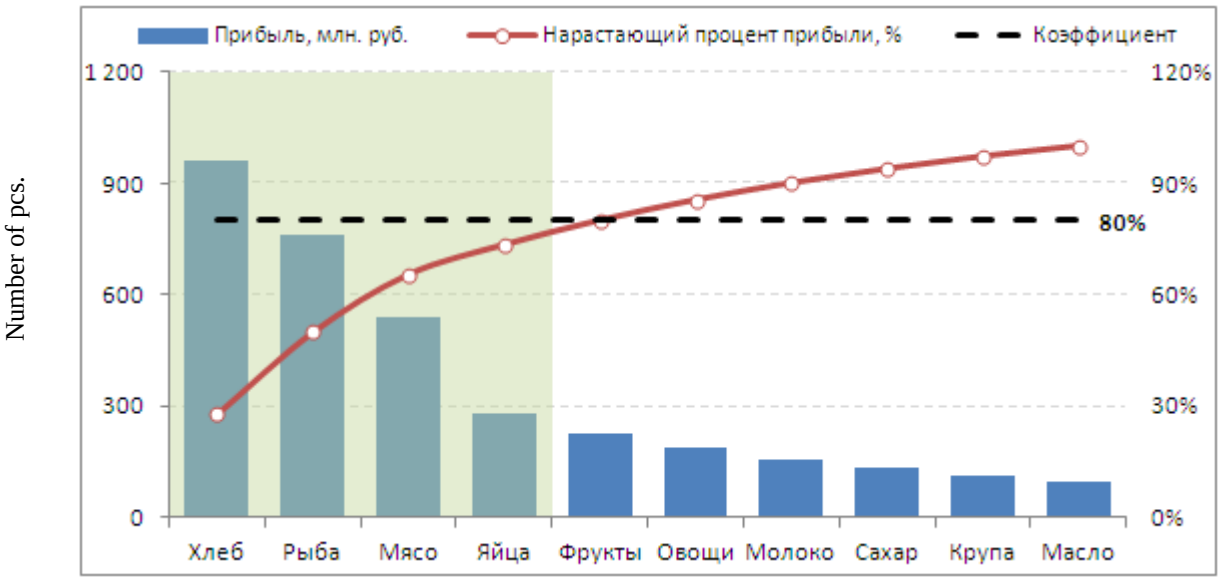

Figure 16 The second option for building the final form of the Pareto chart in Excel

Let's clarify the stages of solving the problem of constructing a Pareto chart in Excel, namely:

Stage 1. First you need to decide:

1. What problems need to be investigated (e.g. defective products, money losses, accidents);

2. what data needs to be collected and how to classify them (for example, by the types of defects, by the place of their occurrence, by processes, by machines, by workers, by technological reasons, by equipment, by measurement methods and measuring instruments used; not common signs combined under the general heading "other");

3. Determine the method and period of data collection.

Stage 2. Development of a checklist for registering data with a list of the types of information collected.

Stage 3. Filling out the data registration sheet and calculating the totals.

Stage 4. Development of a table for checking data with columns for totals for each checked feature separately, the accumulated sum of the number of defects, percent of the total and accumulated interest (table 3).

Stage 5. Arrangement of data obtained for each checked attribute, in order of importance and filling out the table (see table 3).

Table 3. Results of data registration by types of defects for building a Pareto chart in Excel

Types of defects	Number of defects	Accumulated number of defects	The percentage of the number of defects for each feature to the total amount	Accrued interest
Deformation	104	104	52	52
Scratches	41	146	21	73
Sinks	twenty	166	ten	83
Cracks	ten	176	5	88
Stains	6	182	3	91
The gap	4	186	2	93
Other	fourteen	200	7	100
Total 200	-			

The group "other" should be placed in the last line regardless of its numerical values, since it is a set of features, the numerical result for each of which is less than the smallest value obtained for the feature selected in a separate line.

Stage 6. Drawing horizontal and vertical axes.

1. The vertical axis contains percentages, and the horizontal axis contains intervals in accordance with the number of controlled features.

18 and 19).

2. The horizontal axis is divided into intervals in accordance with the number of controlled features.

Stage 7. Building a bar chart (figure

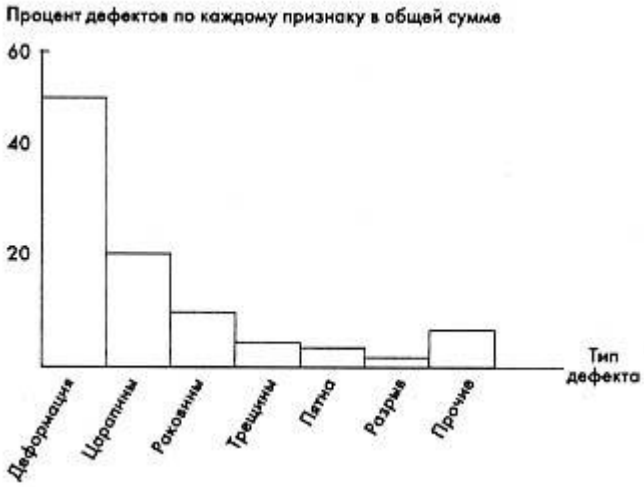

Figure 18. Pareto Chart

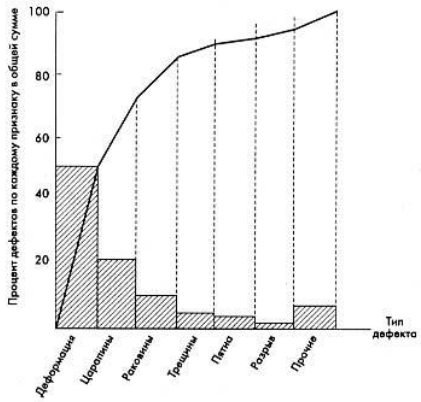

Figure 19. Cumulative Curve in Pareto Chart

Stage 8. Drawing a cumulative curve (Pareto curve) on the diagram (Fig. 19).

Step 9. Drawing on the diagram of all designations and inscriptions concerning the diagram (name, marking of numerical values on the axes, the name of the controlled item, the name of the diagrammer), and data (the period of information collection, the object of research and the place of its conduct, the total number of objects of control).

After identifying the problem by building a Pareto chart from the results, it is important to determine the causes of its occurrence. This is necessary to solve it. When using a Pareto chart to identify performance and causes, the most common method is ABC analysis.

The essence of ABC analysis in this context is to identify three groups that have three levels of importance for quality management:

1. group A - the most important, significant problems, causes, defects. The relative percentage of Group A in the total number of defects (causes) is usually 60 to 80%. Accordingly, the elimination of the causes of group A has a high priority, and the related activities are the highest efficiency;
2. group B - reasons that in total have no more than 20%;
3. group C - the most numerous, but at the same time the least significant causes and problems.

An example of using ABC analysis within the Pareto chart is shown in Figure 20.

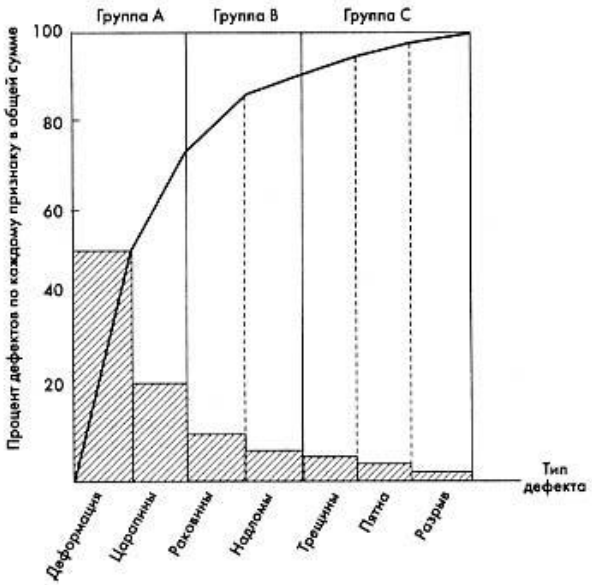

Figure 20 - An example of using ABC - analysis within the framework of the Pareto chart

ABC analysis makes it possible to reasonably determine the priorities of work on managing the quality of manufacture of import-substituting products.

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.

The domestic light industry is going through hard times, and the consumer is offered products of dubious quality that have entered our markets by counterfeit and other illegal means, that is, they have no guarantees for buyers to exercise their rights to protect themselves from unscrupulous manufacturers and suppliers.

To reanimate the role and importance of a quality-oriented strategy, since only in this case business leaders will subjectively and objectively have to improve their production using nanotechnology, innovative processes and digital production, so that competitive and import-substituting materials and products fully meet the needs of domestic consumers. At the same time, our statement is substantiated that the consumption of domestic materials and products is regulated by the market. In this case, market requirements should shape the role of the state and consumers in production in the formation of sustainable demand for domestic materials and products, namely:

maintain a range of goods, regulating it by federal, regional and municipal orders;

stimulate price stability; increase consumer ability and gradually improve their quality. The implementation of these tasks will create the basis for the consumer to realize the need to pay for the advantages of high-quality materials and products, and the manufacturer to realize that improving the quality of materials and products cannot be associated only with rising prices, but also due to technical innovations in digital production, aimed on the use of new technological and engineering solutions.

Today, and even more so tomorrow, it is important to implement one of the defining principles of production efficiency - the manufacturer produces exactly what is needed not only for domestic, but also for foreign consumers.

It is no less important to understand the role and significance of quality activities, that is, how much managers have penetrated into the essence of things, have learned to manage things, change their properties (assortment), form, forcing them to serve a person without significant damage to nature, for the good and in the name of man.

Both political leaders and the government have recently begun to talk about the need for a competent industrial policy. However, if we carefully consider the normative, methodological documents on the structural restructuring of industry, then the thought arises whether we are not stepping on the same rake here that we have been stepping on during all the years of reforms.

What is the essence of economic reforms and the importance of industrial policy in them, which are theoretically substantiated and practically tested by a number of developed countries?

These are the fight against inflation, the strengthening of the national monetary unit and financial stabilization. This is a change in the forms of ownership in various spheres of the economy through the process of privatization. This is a restructuring of the economy under the conditions of market relations.

Moreover, all these fundamental processes of economic reform must be based on structural adjustment. Both financial stabilization and

privatization should be subordinate to the process of structural adjustment, since it is structural adjustment that determines the final result of reforms and the effectiveness of adaptation of various forms of production to civilized market relations.

The end result should also be the basis for the restructuring of the economy. And these are products, services - their competitiveness in the domestic and world markets.

What happened in the Russian reforms? All three basic processes (financial stabilization, privatization and restructuring) went on their own, without interconnection. Therefore, the methods used by the government and the Central Bank to combat inflation and other economic indicators often ran counter to the tasks of structural adjustment.

As for the process of restructuring, the government's position is expressed by the following statement: "the market will put everything in its place by itself." With such a position towards structural restructuring, it is not surprising that at that time there was no place for the words quality, competitiveness, import substitution in the national economic policy.

This is, unfortunately, the reality of the reforms carried out today. In this connection, I would like to refer to the well-known world experience.

A world-renowned quality specialist E. Deming, who at one time was a scientific advisor to the Japanese government and led Japan out of the economic crisis, in his book "Out of the Crisis" says: "managing paper money, not a long-term digital production strategy is the way into the abyss".

Regarding whether the state needs to pursue industrial policy, one can quote the statement of the outstanding economist of the past, Adam Smith, who 200 years ago laid the foundations for the scientific analysis of the market economy. About the role of the state, he said: "... only it can, in the interests of the nation, limit the greed of monopolists, the adventurism of bankers and the egoism of merchants." It is as if today about us and about our situation in the economy.

What are the results of economic activity today, what are the achievements in this area? Growth of gold and foreign exchange reserves, decrease in inflation, budget surplus and other financial and economic achievements. Is this the end result of public administration? And not the quantity and quality of goods and services sold in the domestic and foreign markets, and not the population's ability to pay to purchase these goods and services? And, ultimately, not the quality of life of the country's population ???

Therefore, it is quite natural that today the task is posed for all levels of the executive and legislative authorities - to improve the quality of life of Russian citizens.

Let's carry out an enlarged factor analysis of the quality of life problem. The quality of life of citizens depends on the quality of consumed goods and services in the full range - from birth to ritual services, as well as on the ability to pay of citizens, which allows them to purchase quality goods and services. These two factors (quality and solvency) depend on the state of the country's economy, which in turn depends on the efficiency of enterprises in various sectors of the economy, including light industry. The efficiency of enterprises' work depends on the state of management, on the level of application of modern management methods.

The existing world practice of widespread use of modern methods is based on standardization and certification. Standardization allows you to generalize best practices, formalize them in an accessible and understandable form and make them the property of everyone who wants to apply these best practices. Certification allows you to assess the level of implementation of the requirements of standards in practice and give an appropriate guarantee for the consumer. Currently, no more efficient mechanism has been invented for the dissemination of advanced experience in solving various problems, and in the world there are corresponding international structures for standardization and certification.

An analysis of the current international standards, which are aimed at improving the level of enterprise management, shows the following areas of their action:

– quality management systems (a series of international standards ISO 9000 and industry supplements);

– environmental management systems (series of international standards ISO 14000);

– occupational safety and health systems (OHSAS 18001);

– social responsibility system (SA 8000)

The structure of the “quality of life” problem and a set of international standards aimed at solving it.

At the same time, international standards for quality management have the most significant and global character. The use of modern methods in them makes it possible to solve not only the problem of improving quality, but also the problem of economy and the problem of productivity. That is, today the concept of "quality management" is being transformed into the concept of "quality management".

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 directions of the state's economic policy.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2021 **Issue:** 11 **Volume:** 103

Published: 01.11.2021 **http://T-Science.org**

QR – Issue QR – Article

Arthur Alexander Blagorodov
Institute of Service Industry and entrepreneurship (branch) DSTU
Bachelor

Vladimir Timofeevich Prokhorov
Institute of Service Industry and entrepreneurship (branch) DSTU
Doctor of Technical Sciences, Professor
Shakhty, Russia

Konstantin Andreevich Mikhailov
Institute of Service and Entrepreneurship (branch) DSTU
Ph.D., Associate Professor
Shakhty, Russia

Galina Yurievna Volkova
LLC TsPOSN «Ortomoda»
Moscow, Russia

ON THE IMPORTANCE OF THE THEORY OF STRATEGIC MANAGEMENT FOR EFFECTIVE PRODUCTION QUALITY ASSURANCE OF DEMANDED AND COMPETITIVE PRODUCTS

Abstract: *In the article, the authors, within the framework of partnerships, considered the role and importance of a wide range of stakeholders for the production of in-demand and import-substituting products. At the same time, they reasonably confirmed the importance of the theory of strategic management to ensure the quality of their manufacturing of competitive and demanded products. But this is only possible if the concept of interest is implemented in decision-making taking into account all stakeholders. Only in this case the enterprise guarantees itself stable TP and a stable financial condition.*

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

Language: *English*

Citation: Blagorodov, A. A., Prokhorov, V. T., Mikhailov, K.A., & Volkova, G. Y. (2021). On the importance of the theory of strategic management for effective production quality assurance of demanded and competitive products. *ISJ Theoretical & Applied Science, 11 (103)*, 124-162.

Soi: http://s-o-i.org/1.1/TAS-11-103-6 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2021.11.103.6

Scopus ASCC: *2000.*

Introduction

UDC 519.47: 357.49

The task of increasing competitiveness is especially urgent for shoe enterprises, which, due to external factors (increased competition due to globalization, the global financial crisis) and internal (ineffective management), have lost their competitive positions in the domestic and foreign markets. In response to negative processes in the external environment, the processes of regionalization and the creation of various network structures are intensified, one of which is the union of commodity producers and the state.

There are three main options for the concept of an enterprise in a developed economy: neoclassical,

agency (stock) and the concept of partnerships.

The concept of partnerships, or stakeholder theory, examines the dependence of a firm's actions on the interests of a wide variety of stakeholders, including consumers, suppliers, shareholders, managers, employees, etc. Moreover, each of the partners has certain rights to control the enterprise. therefore, the concept assumes the need to make decisions taking into account their interests.

The theory of strategic management is one of the most difficult areas of management science. For a fairly short period of its existence, characterized by the rapid development of a number of concepts, it managed to turn into an independent scientific discipline with its own academic infrastructure. The most important question that theory must answer is the identification of the sources of long-term competitiveness of enterprises. These sources are determined by the strategy of the enterprise and, accordingly, raise the question of its nature.

The systemic concept of the enterprise can be considered as a starting point for the strategic description of enterprises at the present time, since none of the above concepts "in its pure form represents a scheme for analysis, relevant to the real situation and role of the enterprise in any economy."

Insufficient adequacy of the concept of partnership relations of an enterprise follows from the fact that the behavior of industrial enterprises is determined to the greatest extent by the interests of only the internal top management and large owners.

However, it should be noted that this situation was typical for the 90s of the last century, but recent years have been characterized by changes in this area. Evidence of this is the gradual development and spread of the corporate governance system in the country, one of the principles of which directly emphasizes the role of stakeholders in enterprise management. One cannot fail to note the recent increase in attention to the concept of social responsibility of business.

The simultaneous coexistence of several concepts that describe the decision-making mechanism in enterprise management is due to the fact that different enterprises have specific tasks at different stages of their activities.

In particular, not all enterprises are the main consumers of stakeholder theory, but only those that are interested in maintaining relationships with a wide range of partners and in managing them. For such enterprises, stakeholder theory can offer non-standard approaches to address their specific challenges.

There are certain relationships between the company and partners, they can be different, both competitive and collaborative. Partners can exist independently of each other, or they can interact. The set of partners, which the adherents of this theory call "a coalition of business participants" or "a coalition of influence", is a force that continuously influences an organization, forcing it to evolve, change and adjust.

In the modern interpretation of stakeholder theory, partners are viewed not just as groups and individuals affected by the organization's activities, but as contributors of a certain type of resource. Stakeholders provide the enterprise with the resources necessary for its activities, because its activities allow satisfying its needs. At the same time, the satisfaction of the partner's requests is nothing more than the receipt by him of resources from the organization. Thus, the relationship between the enterprise and its partners is built around the resource exchange, since each seeks to create its own resource base that would best suit the goals of the partners.

The partners of the enterprise can be divided into two groups: external and internal. External partners include: buyers, suppliers, competitors, government agencies and organizations, municipal, regional and federal authorities, financial intermediaries.

Buyers. Strategies and tactics for working with important customers include joint meetings to identify the drivers of business change, mutual efforts to develop products and the market, increase communication, use common space, and joint training and service programs. Strengthening customer relationships often provides significant benefits.

Suppliers. Many businesses involve strategically important suppliers in the product development and manufacturing process. Most businesses that use the “just-in-time” method, when components produced by suppliers are delivered directly to assembly shops, bypassing the warehouse, include suppliers in their internal processes.

Competitors. Competitors are a difficult problem because it often happens that it is in the best interest of one competitor to flinch another. However, competitors are joining forces to tackle the threat of innovative third-party products, to successfully navigate life cycles and to leap ahead with new technologies. Competing organizations form alliances to accelerate technological progress and new product development, to enter new or foreign markets, to search for a wide range of new opportunities. Sometimes cooperation is determined by the need to develop common standards, create a common service system, etc.

Government agencies and organizations. Innovation centers, public-private enterprises and government bodies have many common goals, including the creation of favorable conditions for international trade, stable market conditions, inflation control, a successful economy, and the production of necessary goods and services. Government-business partnerships (public-private partnerships) are widely practiced in foreign countries, where governments often play a more active role in the country's economic development.

Regional and municipal authorities. Good relationships with local and regional branches of

government can lead to beneficial local regulations for businesses or reduced local taxes. Therefore, the most far-sighted business leaders spend some funds to help regional and municipal branches of government in their efforts to solve local problems. Sponsorship to support local social programs, assistance to general education schools, cultural institutions, health care, law enforcement, etc. allow reaching mutual understanding and support from such influential partners for small and medium-sized businesses as regional and municipal authorities.

Financial intermediaries are a collection of many organizations, which include, but are not limited to, banks, law firms, brokerage firms, investment advisors, pension funds, mutual fund companies, and other organizations or individuals who may be interested in investing. to the enterprise. Trust is especially important when dealing with creditors. Financial disclosure helps build trust, as does timely payments. In an effort to build relationships with creditors and establish relationships of trust, many businesses invite their representatives to their boards of directors.

Main part

Currently, there is no generally accepted methodology for assessing the competitiveness of an enterprise. A review of existing approaches to assessing the competitiveness of an enterprise made it possible to combine them into the following groups.

The first group of learned economists includes an approach to determining the competitiveness of enterprises based on the identification of competitive advantages. This approach arose with the emergence of strategic planning and the development of competition theory. It allows you to analyze the achieved competitive advantages of an enterprise, but does not provide an accurate quantitative expression of the assessment results and therefore cannot be used for a comparative analysis of the competitiveness of enterprises, analysis of the implementation of the plan to increase competitiveness, the dynamics of the competitiveness of enterprises.

The second group of economistsoffers an assessment of competitiveness using polygonal profiles. It is based on the construction of vectors of competitiveness by factors: concept, quality, price, finance, trade, after-sales service, foreign policy, pre-sales preparation. However, the authors do not specify how such factors as concept, foreign policy, pre-sale preparation, etc. can be assessed by combining them into one whole.

The third group of economists -offer a rating assessment of the competitiveness of an enterprise based on the following factors: product, assortment, price, image, service, packaging (design), sales volumes, market segment, supply and sales policy, advertising and demand stimulation, that is, with the calculation of the efficiency coefficient of innovative technological solutions ... The advantage of this approach is that it, in fact, evaluates not only the marketing activities of the enterprise, but also takes into account other important resources of the enterprise's potential (innovation, management, finance, etc.). In the approach proposed by the authors, a more significant sum of factors is obtained, the mutual weight of which is taken into account in partnership.

Fourth group scientists-economists proposes to assess the competitiveness of an enterprise on the basis of the product of an index for the mass of commodities and an index of the efficiency of an object. The advantage of this approach is the fact that it is a more weighty approach to assessment, since it takes into account such important factors that determine the competitive advantages of an enterprise as the level of organization and implementation of marketing at the enterprise, finance, and export potential. In addition, most authors consider it important to develop a methodology for determining a manufacturer's efficiency factor, its competitiveness, which will form the effectiveness of these very partnerships.

The fourth approach includes the method proposed by R.A. Fatkhudinov, which proposes to evaluate the competitiveness of an enterprise as a weighted sum of the competitiveness of the main products of the enterprise in various markets, taking into account the importance of the markets. But this approach is not entirely fair, since firstly, the competitiveness of an organization is identified with the competitiveness of a product (these are different concepts), and secondly, he proposes to introduce the importance of foreign markets twice as large as the importance of national markets. Thirdly, the assessment method of Fatkhutdinov R.A. does not take into account other important factors influencing competitiveness - marketing, finance, innovation, management, personnel.

Fifth group scientists-economists proposes an approach based on a balanced assessment of the factors of enterprise competitiveness. The integral indicator of the competitiveness of the enterprise is determined according to the rules of linear convolution (the assessment of the factors of the competitiveness of individual aspects of the activity of the enterprise is multiplied by the weight of individual factors in the total amount), that is, something close to what is proposed by the authors of this article, namely, the calculation of the coefficient of efficiency of innovative technological solutions ...

So, the analysis of the theoretical and methodological aspects of the competitiveness of enterprises revealed many methods for assessing this very competitiveness of enterprises.

In this regard, the successful activity of the enterprise will be determined by the degree of satisfaction of the interests of the interested parties,

therefore, in order to increase the competitiveness and efficiency of the activity, the enterprise must take into account not only its own interests, but also the interests of interested parties, its business partners.

In the theory of stakeholders, the term partnership is used, which forms the conditions for ensuring the effectiveness of the results of the enterprise's activities.

A developing small and medium-sized enterprise, as a tool of competition, needs to form a system of marketing relationships with partners, a system based on mutually beneficial long-term cooperation, which makes it possible to reduce the time for making effective commercial decisions.

Therefore, taking into account the considered methodological foundations of the enterprise competitiveness, a method is proposed for assessing and analyzing the competitiveness of shoe enterprises operating in the regions of the Southern Federal District and the North Caucasus Federal District, based on the theory of stakeholders, namely, Donobuv CJSC (Rostov-on-Don) and LLC "Leonov" (Rostov-on-Don), which are competitors in the production of men's shoes.

Taking into account the analysis of the system of indicators for assessing the competitive potential of the enterprise, we will give an assessment of these enterprises according to the system of indicators for assessing the factors of competitiveness enterprises proposed above. The first important factor in the competitiveness of an enterprise is the competitiveness of a product.

All calculations are reduced to the implementation of successive stages.

*Stage 1.*Calculation of the significance of consumer properties in assessing the competitiveness of women's outerwear. The significance of consumer properties is proposed to be calculated using the direct assessment method. For this, a questionnaire is proposed, in which each respondent needs to determine the importance, in his opinion, of each consumer property of a product within the scale used. The weighting factor is calculated separately for each analyzed segment according to the following formula 1:

$$\alpha_j = \frac{O_{\text{cp}}}{\sum_{j=1}^{n} O_{\text{cp}j}}, \qquad (1)$$

where α_j - coefficient of significance of the i-th property; $O_{\text{cp}j}$ - the estimate of the i-th property given by the j-threspondent, score; n is the number of estimated properties of the product.

The condition for the correctness of the calculation of the significance coefficient is the following: ai = 1.

At this stage, the significance of consumer properties in assessing the competitiveness of men's shoes is calculated. 50 respondents were interviewed who rated all consumer properties in points. The results of the assessment are presented in the table.

To do this, we will segment the market and select target segments (Table 1).

The largest number of consumers (76%) are ordinary buyers (“moderate”). Half of the respondents have an average income (50%), although the income level is “below average” (38%) more than three times higher than the number of those with an income “above average” (38% and 12%, respectively).

Table 1. Characteristics of target segments of men's shoes

Criteria name	number		Segment characteristics
	%	human	
Attitude to fashion	14	7	"Avant-garde"
	76	38	"Moderate"
	10	5	"Conservatives"
Age	62	31	"Youth group"
	26	13	"average age"
	10	5	"Older age"
	2	1	"Venerable age"
Income level	38	19	"below the average"
	50	25	"average"
	12	6	"above the average"
Social status	38	19	"Low social status"
	38	19	"Average social status"
	24	12	"High social status"

We group the questionnaires according to the criterion "attitude to fashion", since this criterion is decisive in consumer preferences (segment-forming). All other criteria (age, income level, social status) are

expressed in it.

Based on the results of grouping questionnaires, we build segment profiles (Table 2).

Based on the compiled table, it can be seen that fashionable products are preferred by respondents who are among ordinary buyers ("moderate") of the younger group, as this emphasizes their individuality, although their income level is below average.

Table 2. Segment profiles of consumers of men's footwear

Segmentation signs	Segments		
attitude to fashion	"Avant-garde"	"Moderate"	"Conservatives"
age group	Youngest - 5 Average - 2	Youngest - 26 Average - 10 Senior - 2	Senior - 3 Venerable - 2
income level	Medium - 3 Above average - 4	Below average - 16 Medium - 20 Above average - 2	Below average - 4 Medium - 1
sought benefits	Individuality - 6 High quality of goods - 1	Individuality - 13 High quality goods - 17 Low price - 8	Low price - 4 High quality of goods - 1

Based on the above data, it is possible to calculate the importance of consumer properties in assessing the competitiveness of a product based on the answers of the "avant-garde" (table 3).

Table 3. Calculation of the significance of consumer properties in assessing the competitiveness of men's shoes based on the answers of the "avant-garde"

Properties	Compliance with the direction of fashion	Arts. registration	Workmanship	Comfort	Strength	Appearance and quality of the material	Price	Total
	34	32	30	31	22	28	29	206
Aai	0.165	0.155	0.146	0.15	0.107	0.136	0.141	1

Let us calculate the importance of consumer properties in assessing the competitiveness of a product based on the answers "moderate" (Table 4).

Table 4. Calculation of the significance of consumer properties in assessing the competitiveness of men's shoes based on the responses of "moderate"

Properties	Compliance with the direction of fashion	Artistic decoration	Workmanship	Comfort	Strength	Appearance and quality material	Price	Total
	154	171	149	169	130	159	167	1099
Aai	0.14	0.156	0.136	0.154	0.118	0.145	0.152	1

Let's calculate the importance of consumer properties in assessing the competitiveness of a product based on the answers of the “conservatives” (Table 5).

Table 5. Calculation of the significance of consumer properties in assessing the competitiveness of men's shoes based on the answers of the "conservatives"

Properties	Correspondence fashion direction	Artistic registration	Workmanship	Comfort	Strength	Appearance and material quality	Price	Total
	10	17	19	18	21	20	23	128
Aai	0.08	0.133	0.148	0.141	0.162	0.156	0.18	1

*Stage 2.*Selection of experts. The formation of an expert group is carried out on the basis of their self-assessment, by filling out a questionnaire. Trade workers (commodity experts, sellers) act as experts. A total of 10 experts were interviewed. Of these, 5 - 7 people are selected into the group who received the maximum amount of marks in all areas. They were asked three questions each. In total, five experts were interviewed, of which four experts received the highest marks in three areas (9 points). They were brought in to study the competitiveness of men's shoes. Then the experts were asked to rate the properties of men's shoes on a five-point scale.

Stage 3. Selection of competing products (assortment) for comparison of competitiveness, products of those manufacturers are selected that, firstly, serve similar segments, and secondly, are in steady demand in the market.

Stage 4. Evaluation of consumer properties of men's footwear (assortment) by target segments.

To compare the consumer properties of assortment groups of different manufacturers, it is also necessary to use a questionnaire. The respondents are asked to give an assessment in points on a five-point scale for each consumer property of the compared groups of goods. The rating scale is indicated in the questionnaire. The results are summarized in the final table 6.

Table 6. Evaluation of consumer properties of men's shoes

Properties	Compliance with the direction of fashion	Decoration	Workmanship	Comfort	Strength	Appearance and quality of the material	Price
Dono shoes	3.33	3.17	3.67	3.42	3.75	3.83	3.33
Leonov	3.27	2.49	3.37	2.84	3.29	3.31	2.96
Mean	3.3	2.83	3.52	3.13	3.52	3.57	3.145

*Stage 5.*Determination of the average rating for consumer properties for each segment. The questionnaires grouped by target segments are processed as follows.

For each consumer property, the average value of the assessment in points is found as the arithmetic mean for all respondents of this target group. We will summarize the data in table 7.

Table 7. Average rating of men's footwear by consumer properties of "avant-garde", "conservative"

Properties	Compliance with the direction of fashion	Decoration	Workmanship	Fit on the figure	Strength	Appearance and quality of the material	Price
"Vanguardists"							
Dono shoes	3.33	3.17	3.67	3.42	3.75	3.83	3.33
"Conservatives"							
Leonov	3.27	2.49	3.37	2.84	3.29	3.31	2.96
Mean	3.3	2.83	3.52	3.13	3.52	3.57	3.145

Stage 6. Calculation of the total assessment of the competitiveness of the goods.

The level of competitiveness of a product according to the assessment of the target segment is determined by the following formula (2).

$$K = \sum_{i=1}^{m} \alpha_i \cdot O_{cp}, \qquad (2)$$

where K is the total assessment of the absolute competitiveness of the goods given by the target segment, point; α_i - the significance of the i-th consumer property for the target segment; OSR is the average score of the i-th consumer property given by the target segment, point; m is the number of compared consumer properties.

Thus, the total assessment of the competitiveness of the same product, given by representatives of different segments, will differ. To make managerial decisions on competitiveness, the analysis uses the results of assessing the competitiveness of men's shoes, which were put down by representatives of the target segment.

The maximum score for the product coefficient is 5 points.

In fact, the level of competitiveness may be below the maximum mark.

Let's calculate the competitiveness of enterprises, taking into account the significance defined above. We will enter the obtained data in table 8.

Table 8. Analysis of the competitiveness of men's shoes

Properties	Correspondence fashion direction	Decoration	Workmanship	Comfort	NSprecision	Appearance and quality of the material	Cena	TOcompetitiveness	Place order
The significance of ai	0.138	0.154	0.138	0.15	0.12	0.145	0.153		
Dono shoes	0.46	0.49	0.51	0.51	0.45	0.56	0.51	3.49	1
Leonov	0.45	0.38	0.47	0.43	0.39	0.48	0.45	3.05	2

According to Table 8, it can be seen that men's footwear of Donobuv CJSC are more competitive than the same range of Leonov LLC.

The rest of the indicators for assessing the competitiveness of enterprises will be taken from the technical and economic indicators of enterprises, data from the balance sheet.

Let's calculate the dimensionless estimates of the

indicators of the competitiveness of enterprises and summarize everything in Table 9.

To convert the dimensional estimates of indicators into dimensionless, it is proposed to use the index method. Which was discussed above.

So, based on the presented data, pLet us calculate the generalizing indicators of the competitiveness of the studied enterprises using the formula (6.1):

- for LLC Leonov: $K_{П} = 59,65$ %;

- for JSC "Donobuv": $K_{П} = 70,88$ %.

As can be seen from the scale for assessing the qualitative level of competitiveness, LLC Leonov and CJSC Donobuv have an average level of competitiveness in the market of footwear enterprises in the Southern Federal District and the North Caucasus Federal District.

Let us analyze the second most important potential of enterprise competitiveness - marketing efficiency. Data on this potential are presented in table. 6.10, where we indicate the weighted estimates at the studied enterprises and the maximum estimate for these indicators.

As can be seen from the table 10 below, the deviation in terms of potential marketing efficiency in Leonov LLC is 7.97, in Donobuv CJSC - 5.4. The greatest influence on this deviation is exerted by the indicator of the level and quality of partnerships with stakeholders, therefore, in order to increase the effectiveness of marketing activities, the enterprises under study should establish and develop relationships with partners.

Table 9. Assessment of the competitiveness of enterprises

Enterprise competitiveness factors	Indicators	Significance,%	The values		Dimensionless estimates of enterprise competitiveness indicators		Weighted estimates of competitiveness indicators	
			LLC Leonov	Donobuv CJSC	LLC Leonov	Donobuv CJSC	LLC Leonov	Don-obuv CJSC
1	2	3	4	5	6	7	8	9
1.Competitive commodity ability	Weighted average for the product range of competitiveness of the goods, score	40	3.05	3.49	0.61	0.69	24.4	27.92
2. Marketing Effectiveness	Assessment of the level of partnerships with stakeholders of the enterprise, score	10	2.85	3.05	0.71	0.76	7.10	7.60
	Exceeding the permissible level of Goth stocks. products,%	3	66.50	28.80	0.34	1.00	1.02	3.00
	Market share of the enterprise,%	3	3.00	7.30	0.08	0.20	0.24	0.60
	Sales growth rate,%	3	221.00	198,00	0.89	0.80	2.67	2.40
3. Quality management	Return on investment	3	0.85	4.02	0.08	0.39	0.24	1.17
	Return on total assets,%	3	10.90	43.90	0.17	0.53	0.51	1.59
4. Financial condition of the enterprise	Coefficient of provision own werewolves. by means (0.2)	3	0.19	0.76	0.95	3.80	2.85	11.40
	Current liquidity ratio (≥1.3)	3	1.46	4.16	0.26	0.79	0.78	2.37
	Costs per 1 rub. realiz. Products	3	0.69	0.53	0.86	1.00	2.58	3.00

5.The level of organization of production	Capacity utilization rate	2	0.83	0.95	0.87	1.00	1.74	2.00
	Labor productivity	2	48.19	60.22	0.64	0.80	1.28	1.60
	Wear of mains funds,%	2	26.00	47,00	0.38	0.21	0.76	0.42
6. Efficiency of MTO	Assessment of relationships with suppliers, score	3	7.28	7.99	0.73	0.80	2.18	2.40
	Material efficiency, RUB / RUB	3	20.45	13.48	0.13	0.12	0.39	0.36
7. Activity of innovators. activities	Share of innovative products,%	8	1.30	0.13	1.00	0.10	8.00	0.80
8. Competitiveness of personnel	The coefficient of the outstripping growth of labor productivity in relation to the growth of wages	3	2.06	1.56	0.95	0.72	2.85	2.16
	Personnel turnover rate,%	3	7.00	6.00	0.02	0.03	0.06	0.09
	Total maximum significance score	100	-	-	-	-	59.65	70.88

Table 10. Analysis of the effectiveness of using marketing potential

Indicators for evaluating the effectiveness of marketing	Significance,%	Weighted estimates of competitiveness indicators		Maximum weighted score	Deviation of the weighted estimate from the maximum	
		LLC Leonov	Donobuv CJSC		LLC Leonov	Donobuv CJSC
Assessment of the level of partnerships with stakeholders of the enterprise, score	10	7.1	7.6	10	-2.9	-2.4
Exceeding the permissible level of Goth stocks. products,%	3	1.02	3	3	-1.98	0
Market share of the enterprise,%	3	0.24	0.6	3	-2.76	-2.4
Sales growth rate,%	3	2.67	2.4	3	-0.33	-0.6
Total	19	11.03	13.6	19	-7.97	-5.4

So, when assessing the competitiveness of the studied enterprises, it was revealed that the level of competitiveness of LLC Leonov, CJSC Donobuv is average (59.65% vs. 70.88% respectively). One of the important factors that influences the assessment of competitiveness is the effectiveness of marketing. The analysis shows that the deviation for this potential is 7.97 in Leonov LLC, Donobuv CJSC- 5.4... To improve marketing effectiveness, businesses should implement a stakeholder framework that will foster relationships with partners.

So, in order to increase the competitiveness of the studied enterprises on the basis of the theory of partnerships, it is proposed to introduce mechanism for the formation of interaction with stakeholders.

Thus, the theory of partnerships is becoming relevant today, therefore, taking into account the importance of this factor, a methodology for assessing the competitiveness of an enterprise has been developed, taking into account a new paradigm - the theory of partnerships. The developed methodology for assessing and analyzing the competitiveness of an enterprise based on the theory of partnerships allows an in-depth analysis of the competitiveness of enterprises, taking into account an important factor of competitive advantages in a networked economy - the

quality and level of development of partnerships.

As the main unique aspects of the formation of the competitive advantage of enterprises based on the theory-oriented partnerships can be distinguished:

- creation and permanent expansion of a database of key partners;
- formation of the necessary technical base (computers, peripherals and software);
- organization of the activities of the unit and individual managers for managing relationships with stakeholders;
- development and adjustment of plans for interaction with key partners, taking into account their business and personal characteristics;
- regular audit of the activities of managers for managing relationships with partners in the context of assessing the following indicators:
- the number of meetings with partners, the number of prepared commercial offers, the number of contracts concluded, the dynamics of the volume of supplies of products attributable to each partner;
- regular marketing research within the framework of partnerships in order to identify changes in the structure and nature of preferences when choosing partners.

Thus, the above aspects, with the proper level of their elaboration, can allow an enterprise to form a unique competitive advantage - a system of relationships with stakeholders.

Filling technological processes for the production of competitive and popular footwear for consumers in the regions of the Southern Federal District and the North Caucasus Federal District is costly. The use of universal and multifunctional equipment forms the technological process in such a way that it makes it possible to produce the entire assortment of high quality footwear with different price niches, creating priorities for its implementation.

I would like to note one more undoubted merit of the studies carried out by the authors is the fact that, in addition to proposals for manufacturers to use universal and multifunctional equipment for assembling shoe upper blanks and molding upper blanks on a shoe, it is proposed to use the technology of direct casting of the bottom on shoes and such equipment that is capable of both once to ensure the production of the demanded assortment of footwear, both by type and by type, and create the prerequisites for high efficiency of the production itself and satisfy the demand not only of consumers in the regions of the Southern Federal District and the North Caucasus Federal District, but also of domestic and foreign buyers.

Partnerships can be divided into two groups: external and internal. External include: buyers, suppliers, competitors, government agencies and organizations, regional and municipal authorities, financial intermediaries.

Buyers. Strategies and tactics for working with important customers include joint meetings to identify the drivers of business change, mutual efforts to develop products and the market, increase communication, use common space, and joint training and service programs. Strengthening customer relationships often provides significant benefits.

Internal partners include managers, employees, owners, and a board of directors or board, which represents managers and owners. One of the most significant internal partners is a senior executive.

Thus, the success of an enterprise is determined by the degree of satisfaction of the interests of interested parties, therefore, in order to increase the competitiveness and efficiency of activities, the enterprise must take into account not only its own interests, but also the interests of interested parties.

Therefore, taking into account the considered methodological foundations of the competitiveness of an enterprise, a methodology for assessing and analyzing the competitiveness of an enterprise based on the theory of stakeholders is proposed.

Stage 1. Choice indicators for assessing the factors of competitiveness of the enterprise. For each factor, a system of indicators can be determined based on the analysis of scientific literature (Table 11).

So, taking into account the analysis of the system of indicators for assessing the competitive potential of an enterprise, we can propose the following system of indicators for assessing internal factors of competitiveness enterprises (table 12).

Table 11. The system of indicators for assessing the competitive potential of shoe enterprises

Competitive potential factors	Assessment indicators
1. Marketing Effectiveness	The ratio of the quality of the product and the costs of its production and marketing
	Growth rate of marketable products
	Growth in sales and profits
	Profitability
	Market share, image
	The quality of partnerships
Competitive potential factors	Assessment indicators

2. Quality of management	Return on total assets, return on equity; return on investment
	Net profit for 1 rub. sales volume; profit from product sales per 1 rub. sales volume; profit ex. period for 1 rub. sales volume
3. The financial condition of the enterprise	Equity ratio; current liquidity ratio; coverage ratio, autonomy ratio, fixed asset index, total profitability of the enterprise, return on equity, profitability of products
4. The level of organization of production	Production capacity utilization rate; production and sales facilities; volume and directions of investments
	The share of certified products in accordance with international standards of the ISO 9000 series
	Depreciation of OPF, growth of labor productivity
5. Efficiency of MTO	The quality and prices of the supplied materials. Material return, turnover, allowing direct connections; the coefficient of uniformity of goods receipt; profitability of transaction costs; profitability of purchasing goods
6. Activity of innovation activity	Annual expenditure on R&D, number of patents for inventions
	The share of innovative products, the share of product exports, the number of advanced technologies created
	The volume of shipped innovative products (services), the number of patented technologies, the number of patented technologies, the cost of innovation, the number of acquired and transferred new technologies, software
7. Competitiveness of personnel	Personnel turnover rate, coefficient of advance of labor productivity in relation to wages, educational level of the labor force, level of professional qualifications of workers

*Stage 2.*Determination of the importance of indicators in the overall assessment of competitiveness. The significance of indicators for assessing each factor of competitive potential are presented in Table 12.

Table 12. Recommended system of indicators for assessing the competitiveness of an enterprise and their significance

Factors enterprise competitiveness	Indicators	Significance,%
1. Competitiveness of goods	Weighted average for the product range of competitiveness of the goods	40
2. Marketing Effectiveness	Exceeding the permissible level of stocks of finished goods	3
	Market share of the enterprise	3
	Sales growth rate	3
	Assessment of the level of partnerships with stakeholders of the enterprise	10
	Total	19
3. Quality management	Return on investment	3
	Return on Total Assets	3
	Total	6
4. Financial condition of the enterprise	Coefficient of provision with own circulating assets	3
	Current liquidity ratio	3

	Costs per 1 rub. products sold	3
	Total	9
5. The level of organization of production	Capacity utilization rate	2
	Labor productivity	2
	Depreciation of fixed assets	2
	Total	6
6. Efficiency of MTO	Reducing the level of material consumption	3
	Material efficiency	3
	Total	6
7. Activity of innovation activity	Share of innovative products	4
	Cost of innovation	4
	Total	eight
8. Competitiveness of personnel	The coefficient of the outstripping growth of labor productivity in relation to the growth of wages	3
	Employee turnover rate	3
	Total	6
	Total importance of competitive potential	60
	Total maximum significance score	100

The economic meaning of the obtained generalized assessment of competitiveness is that, on the one hand, it shows the degree of satisfaction with the product, and on the other hand, the degree of use of the competitive potential of the enterprise itself.

The proposed methodology for assessing and analyzing the competitiveness of an enterprise, in contrast to the existing ones, firstly, takes into account the specifics of the "light industry" industry, secondly, reduces the subjective factor in the assessment, and thirdly, allows for an in-depth analysis, thanks to the proposed directions and indicators of analysis competitiveness of enterprises. To conduct a survey to assess the competitive potential, we developed a questionnaire (Table 13) and offered it to respondents - students, masters, graduate students, teachers and specialists - university graduates working at light industry enterprises in the regions of the Southern Federal District and the North Caucasus Federal District. In addition, the questionnaire was accompanied by an explanation and examples of its filling, which are given below.

Since the number of related ranks is 8, then in the arithmetic row from 1 to 22 places there will remain 22 - 8 = 14, i.e. there will be only 14 places in the new arithmetic series.

Table 13. Criteria for assessing the competitiveness of light industry enterprises located in the regions of the Southern Federal District and the North Caucasus Federal District

Item No.	List of factors for assessing the competitive potential of enterprises in the regions of the Southern Federal District and the North Caucasus Federal District	Rank
1	The ratio of the quality of the product and the costs of its production and marketing	
2	Sales growth rate	
3	Exceeding the permissible level of stocks of finished goods	
4	Assessment of the level of partnerships with stakeholders of the enterprise	
5	Market share of the enterprise	
6	Return on investment	
7	Return on Total Assets	
8	Cost of innovation	
9	Equity ratio	
10	Capacity utilization rate	
11	Labor productivity	
12	Material efficiency	
13	The share of certified products in accordance with the international standards of the ISO series	
14	Reducing the level of material consumption	
15	Share of innovative products	

16	Trade turnover allowing direct links	
17	The coefficient of advancing labor productivity in relation to the growth of wages	
18	Coefficient of uniform supply of goods to sales markets	
19	Depreciation of fixed assets	
20	Employee turnover rate	
21	Costs per 1 ruble of products sold	
22	Weighted average for the product range of competitiveness of the goods	

As the main unique aspects of the formation of the competitive advantage of an enterprise based on the theory-oriented stakeholders, one can single out:

- creation and permanent expansion of the stakeholder database;
- formation of the necessary innovation base (computers, peripherals and software);
- organization of the activities of the unit and individual managers for managing relationships with stakeholders;
- development and adjustment of plans for interaction with key stakeholders of stakeholders, taking into account their business and personal characteristics;
- regular audit of the activities of managers for managing relationships with stakeholders in the context of assessing the following indicators: the number of meetings, the number of prepared commercial proposals, the number of contracts concluded, the dynamics of the volume of supplies of products attributable to each participant of the interested parties;
- regular marketing research in the process of implementing the developed activities with the participation of stakeholders in order to identify changes in the structure and nature of the preferences of the stakeholders.

Thus, the above aspects, with the proper level of their elaboration, can allow light industry enterprises to form a unique competitive advantage - a system of effective relationships between stakeholders.

An analysis of the questionnaire survey on the impact of the competitive potential of enterprises in the regions of the Southern Federal District and the North Caucasus Federal District, with regret, confirmed the lack of consistency of respondents on the criteria for the quality of light industry products formulated in the questionnaires.

Of greatest interest is the fact that the technology of direct casting of the bottom on shoes today, but what is especially important, and tomorrow will be the most effective for the manufacture of the entire assortment range. This is possible because today the chemical industry offers manufacturers for direct casting of the bottom of shoes polymer compositions that create conditions to use the entire possible list of materials for the upper of shoes and at the same time guarantee consumers high quality, conformity to fashion trends, functionality and affordability and ensure its competitiveness with similar footwear from leading foreign companies, pushing them out of our markets and creating such footwear priorities, that is, import substitution.

The global footwear market is estimated at 260 billion, the growth rate over the past 5 years was 3.5%. China, USA and India are the largest footwear markets. The specific consumption of footwear in Russia is much lower than the level of developed countries. China is the largest footwear exporter and serves all major global markets.

The main growth drivers of the Russian footwear market are an increase in the specific consumption of footwear per person and a decrease in the average cost of a pair. Russia lags far behind in consumption of footwear from developed countries (3 pairs per year in Russia versus 5 - 6 in Europe and 7 - 8 in the USA). By 2025, this figure may increase to 4 couples per person. The average price of a pair by 2025 may increase from 1200 to 1500 rubles at current prices. In 2017, the consumption of footwear in Russia was estimated at 0.81 trillion. rub.

By analogy with garment production, the main factors determining the competitive advantage of a manufacturer are the availability and increase in the volume of domestic raw hides, access to a cheap and productive labor force, access to materials and functional components of shoes (insoles, pads, accessories, etc.) , as well as access to sales markets.

The share of labor costs in footwear production is slightly lower than in sewing, but the main problem today and tomorrow for Russian footwear manufacturers is the difficulty in accessing materials and functional components.

The cost of manufacturing footwear in Russia is 1.5 times higher than in China, and the cost of components is 35% more expensive, since they are imported from China at inflated prices due to small order volumes, the cost of labor in Russia is 2 times more expensive than in China.

Opportunities to reduce the effective cost by reducing the delivery time in footwear production are possible only if you provide quick access to materials and components, but the need to import them from Asia does not allow Russian manufacturers to achieve advantages in terms of time. The use of natural leather made in Russia and an increase in the production of leather footwear will reduce delivery times and partly costly components. Another possible tool for solving the problem with components can also be the creation of purchasing alliances - the consolidation of orders

for components can reduce their cost by 20%. By analogy with the segment of technical textiles, shoe production in the world is developing in the format of innovation centers / industrial parks, with a large number of highly specialized players. This allows for economies of scale and flexibility in accessing materials and components.

Shoe production development strategy - consolidation and development within the framework of innovation centers. The main directions of state policy, in addition to those indicated above, to create equal competitive conditions in the footwear market:

– support for the creation of industrial infrastructure within innovation centers:

- Supporting the creation of manufacturing innovation centers by major footwear manufacturers and SMEs to achieve economies of scale and synergies;

- support for the modernization of production to increase labor productivity;

– ensuring favorable access for manufacturers to functional components:

– support for the creation of purchasing alliances for functional components;

– further, support for the partial localization of component manufacturers within the shoe innovation centers.

The total volume of domestic footwear production in the Russian Federation by 2022 may reach 310 - 340 billion rubles (in producer prices), which will correspond to 60% of localization. At the same time, up to 20% of the increase in footwear production will be provided by special and protective products. The estimated volume of required investments in the industry is 95-120 billion rubles, up to 30-50 thousand new jobs can be created. The development of the garment industry will add 0.05% to GDP and provide 36 - 58 billion rubles. tax revenues. The cumulative effect from the development of clothing and footwear production in the Russian Federation will amount to 0.11% of GDP (0.06% from the development of clothing production, 0.05% from footwear production). The total amount of required investments is 180 - 270 billion rubles. 160-200 thousand new jobs will be created. The expected volume of tax revenues by 2025 is 124-162 billion rubles.

For the strategic management of the production of popular products, it is necessary: to study the demand for manufactured footwear and, together with sales, production and supply specialists, develop solutions for removing models from production and updating the assortment; explore sales markets in different regions and various forms of sales organization, study potential buyers; study the reaction of buyers to experienced batches of shoes in specialized stores; jointly with the planning and economic department to develop regulations on their own pricing policy; study the impact of selling prices for different regions; develop a policy of motivating wholesale buyers for the volume of orders, the duration of contracts, etc .; predict possible changes in the situation and develop decisions on the strategy of behavior in new conditions; coordinate conflicting production and marketing requirements; organize and study the effectiveness of advertising activities. You can imagine yourself as a manager of the company "Donobuv", which opened a new shop and chose a new strategy for the production and promotion of footwear in the regions of the Southern Federal District and the North Caucasus Federal District. Here's what can happen. The main markets for the sale of products of JSC "Donobuv" today are Moscow and the Moscow region. The initial data, which is formed by the manager of the enterprise for the board of directors of the enterprise, is to prepare a draft future strategy for choosing a certain type of footwear, namely:

– produce expensive shoes for a high-income target audience (item A);

– specialize in the production of inexpensive shoes for a target audience with earnings above the subsistence level (product B);

– to produce cheap footwear for socially unprotected strata with earnings below the subsistence level (product C).

In the future, the following scenarios of the development of the external environment are possible, the likelihood of which is assessed by the management of the enterprise as follows: an increase in purchasing power (scenario S1, probability of occurrence - 0.2); the invariability of the purchasing power of the population and the influence of foreign competitors (scenario S2, probability of occurrence - 0.5); decrease in purchasing power due to increased inflation with unchanged competition (scenario S3, probability of occurrence - 0.3).

Additional information for making the necessary calculations:

– living wage - 9691 rubles.

– daily release - 576 pairs of shoes;

– number - 100 people, who are engaged in the production of 576 pairs of shoes per day;

– with a working week of 5 days, the total number of working days in a year is 250 days;

– monthly production of shoes - 12,000 pairs;

– annual production of shoes 144,000 pairs.

We will assume that the average cost of one pair of shoes with unchanged purchasing power (scenario S2) will be characterized by the following values: the price of a pair of expensive shoes for a target audience with high earnings is 5 thousand rubles; the price of a pair of shoes for the target audience with earnings above the subsistence level - 2 thousand rubles; the price of a pair of cheap shoes for socially unprotected strata with earnings below the subsistence level - 1 thousand rubles.

The total volume of shoe sales, given the unchanged purchasing power (scenario S2) for the audience in question, will be:

– when selling expensive footwear for a target audience with high earnings - 60 million rubles. per month;

– when selling footwear to a target audience with earnings above the subsistence level - 24 million rubles. month;

– when selling cheap footwear for socially unprotected strata with earnings below the subsistence level - 12 million rubles. per month.

For the target audience with an increase in purchasing power (scenario S1), the price of one pair of expensive shoes will be 5 thousand rubles, the price of one pair of shoes for the target audience with earnings above the subsistence level will be 3 thousand rubles, the price of one pair of shoes for unprotected layers is 1 thousand rubles, with a reduced purchasing power (scenario S3), the price of one pair of expensive shoes will be 2.5 thousand rubles, the price of one pair of shoes for the target audience with earnings above the subsistence level is 1 thousand rubles, the price of one pair shoes for unprotected layers - 500 rubles.

For each of the considered scenarios, the volume of shoe sales per month was calculated. We calculated the sum of the mathematical expectations of the volume of sales, taking into account the probability of three scenarios. Enterprise managers, based on the analysis or their experience (intuitively), assess the likelihood of a particular situation.

Separately for each strategy, the sum of the mathematical expectations of the volume of sales is determined as the product of the volume of shoe sales per month in the implementation of each scenario by its probability. By calculating the amount of mathematical expectation, the sales volume, the maximum sales volume was gained by the strategy of producing expensive shoes for a target audience with high earnings.

Summarizing the information obtained as a result of the study, a structural diagram of the formation of the mentality has been drawn up. The proposed structuring can be used when planning an industrial assortment for the regions of the Southern Federal District and the North Caucasus Federal District. And only in the interconnection of all the above factors, it will be possible to assert the high stability of the financial results of the activities of shoe enterprises in the regions of the Southern Federal District and the North Caucasus Federal District, united into an innovation center.

The assortment of children's shoes should be oriented towards buyers with different income levels, for this, in the production of shoes it is necessary to use leather for the upper of different quality: expensive, such as chevro, or cheaper chrome-tanned pork leather, from which shoes can be worn out, and coming home to take pictures so that the child's legs would rest.

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 recommendations of the authors, 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 generic characteristics of its population.

The main place among the attributes of any enterprise is occupied by the name with which the enterprise goes public. We know the company not by the legal phrase that is recorded in the corresponding registration documents (and it happens to be unfamiliar to a wide range of consumers), but by the trademark of its products. So, a rare consumer knows that the shoes of the Belka Trading House are Ralf Ringer. Most manufacturers of the Southern Federal District do not have a name (trade mark).

There are several ways to form a name, a logo and a trademark.

The most common way is to choose a proper name. Typical for fashion houses (luxury goods) - the name of the company founder CHRISTIAN DIOR, CHANEL, GIVENCHY, YVES SAINT LORAN etc. The unique taste, bright style expressed the personality of the artists in their creations, subsequently giving the things released under this name a high status. This technique has become necessary if an individual or family company is being created and it is required to emphasize the personal role of the owner, and build the reputation and policy of the company on his reputation. With this approach, the role of the individual is invaluable. The surname should become a guarantor of product quality and business conduct. Accordingly, if there is an owner's image, it is not only directly related to the company's image, but also carries the main emotional load.

Another way is that the commercial name of the enterprise is based on an abbreviation formed from the first letters of the official name. This achieves the conciseness of the name and ease of pronunciation and memorization, respectively. It can be clearly seen that the abbreviation is an excellent means of obtaining a logo - the LVMH / Louis Vuitton Moet Hennessy / company. The same method is used by companies positioning their products in the "Bridge better" class, representing the second line of well-known houses; the title contains a reference to the artist's name associated with his luxury line "couture" and "preta - porte de lux" and an abbreviation. For example, Mani (Armani), DKNY (Donna Karan New Your), CK

Jeans (Calvin Klein).

The second - much less common in the fashion industry - is the formation of a name by connecting the root fragments of several words, which are not necessarily present in the name of the company. But in this case, associations with the profile of the firm are desirable. The requirement, like any other group of names, is unusual and euphonious.

The third way is the formation of a new word, not similar to existing meaningful words, but associated with positive concepts. Most often, the positioning of these companies is associated with the bridge middle, bridge low and moderate and buget class mass clothing.

For example, the name of the company "Skorokhod" is the production of children's shoes. Saying "Skorokhod", you can provoke an association with fast movement, and children love to run, they need high-quality and sturdy shoes.

Another example is the name of the company MEXX. There are no close associations, but the name is modern and laconic. It fits well with the positioning of the company - clothes for young people according to the ideal combination of "style, price and quality".

It is necessary to note the huge number of names that use the Latin alphabet when writing their names. It seems to us that the roots of this phenomenon lie in the statements - the legacy of the Soviet era: “there is no fashion in Russia!”, “Domestic means bad”. Accordingly, domestic enterprises that were the first to enter the post-Soviet market were forced to disguise themselves as foreign manufacturers. Gregory, Gloria Jeans, Climona, Vereteno, Festival, ZARINA are numerous examples of this strategy when choosing a company name.

The fourth way is the company logo. The purpose of a logo in the fashion industry is to instantly recognize the brand. A logo is a symbolism that replaces a name or is its graphic interpretation. Interestingly, in the fashion world, the logo has also become a part of clothing and footwear design.

The logo serves as an identification mark for the uninitiated crowd, who by these letters will know how much a particular item cost. This is a cheat sheet for those who cannot define the silhouette of Dolce and Gabanna, Christian Dior or Ferre. With the general trend towards more and more visualization, type graphics are all kinds of pointers. Plates and labels - began to play an increasing role. The logo, as an image replacing the text, becomes an ideal solution if you need to combine decorative and informative content.

In addition to its primary function - a trademark - it plays a decorative role. This is a natural result of the interweaving of the fashion industry and advertising.

Here are the reasons: the first - industrial - fashion for text as a decorative element. The second is the fashion for democratic clothing, i.e. a crisis in the recognition of styles, the binding of an object to a specific brand. The third is pro-advertising. This shift in the "expensive - cheap" framework: it is the design of the product, and not the quality of the materials used or the amount of manual labor, that increasingly determines the consumer value. Oversaturation with advertising information enables the logo to become a decorative element.

The logo is becoming more imaginative and emotional. And you can play with the images, placing it where it was previously unthinkable. Thus, today buyers of fashionable footwear have been made advertising carriers of brands through universal logoization.

The main thing is the correspondence of the emotions caused by the advertising of the product, the brand image and the design of the products themselves. After all, the promotion of the subject should be specific, simple, understandable and vivid, i.e. advertising. At the same time, carry a readable emotionally colored image. This means that you can't do without a logo.

The verbal logo of the enterprise - the name inscribed in a certain way is its most frequently used attribute, which forms the first emotional attachment to the image of the company in the mind of the consumer. A certain way of depicting a verbal logo becomes a distinctive, original feature of an enterprise.

Another important direction in the company's activities to promote its brand is the design in the trade environment. The following requirements are imposed here:

- Convenient location for a specific target audience (Via Corso - boutique street in Milan; and Plaza il Duomo with La Rinaschente department store - both are conveniently located in the center of Milan, but the consumer of these retail spaces is different). As mentioned above, a similar community of boutiques selling footwear will be created in Russia on the basis of the Paris Commune factory. The need for such a base exists in the Southern Federal District and the North Caucasus Federal District - this will allow organizing the regional market;
- Compliance with the concept of presenting the image of the product, i.e. well-thought-out principles of presenting the properties of a product that meet the expected motivation of its choice by the consumer;
- Figuratively, the target solution of the environment should be oriented towards the type of consumer. It should be possible to try on shoes, get advice from the seller;
- The environment should be conducive to stay and provoke interest in the product. Pleasant music can sound in the store; each visitor should be given a booklet with shoe brands;
- According to the figurative decision, the environment should be lifted above the ordinary, create a feeling of “event”, “chosenness”, “fullness of

possibilities" or "accessibility". An enterprise can introduce a system of discounts to re-attract consumers;

- To support an additional range of services within the range of pastime and cultural interests of the consumer. The buyer can be offered a cream for the newly purchased shoes or another clothing accessory with the manufacturer's logo as a gift.

Consumers in the marketplace are not a monolithic community. When buying shoes, they are guided, first of all, by the type of shoes and the price.

For example, when choosing women's boots, the buyer takes into account the seasonality of the shoes, their age characteristics and the type of work, the appearance of the shoes will be important signs: compliance with the fashion direction, color, materials of the top and bottom, as well as the constructive solution of the model. Buyers will also prefer the brand name. It is this offer of footwear to the consumer in specialized stores or departments that will provoke an increase in sales in conditions of unstable demand. And if the seller, possessing well-thought-out principles of presenting the advantageous properties of each design of women's boots, and guessing the mood and capabilities of the customer by their motivated questions when choosing a model, will be able to realize this very desire, then in any case the buyer will leave satisfied that his interests are fully satisfied , and he himself, and his friends, will definitely advise this particular store, where they are always welcome guests, will be correctly understood and where they will be given due attention in order to make a pleasant purchase by joint actions.

Elderly people love comfort and coziness. Both the seller and the buyer - a representative of the fair sex - of course, will turn their attention to the model if it will be pleasant to wear it in a snowy winter, since it should be made of soft nap leather - velor and have a molded sole with a large tread, as it will very comfortable and will provide them with comfort at any time of wearing it. Moreover, it should be affordable.

Business women, whose age is over 45 and up to 45, and who are constantly in the hustle and bustle, of course, will give preference to models made from natural materials, low heels, discreet accessories, creating comfort for the wearer in their daily life, while emphasizing their image and social status.

The appearance in the salon or in a special brand store of fashionistas or high school girls will immediately attract the attention of the salon seller, who will want to offer them only an original model with extra high heels with patch straps, decorated with hoovers and fixed at the top and bottom of the bootleg. The fashionista will be delighted that she has bought what she wanted, and the high school student will be satisfied with the purchase also because she is sure that this purchase will surprise her friends, and for her, this is the most important argument in favor of the purchase.

It is always easy for the seller if a "socialite" appears in the store, since she always prefers only new products or exclusive models. These ambitions of her can be satisfied by the model both due to originality and due to the constructive solution, also due to the selected materials and decorations in the manufacture of this very model.

For girls who love severity, but at the same time originality, the seller will certainly offer a model in which materials of two colors and textures are successfully combined, and the details, perforated, draped on the bootleg, give it an uniqueness.

And the price should not "bite" very much, which is also quite an important argument in favor of buying. These fantasies of ours, spied on in life and working very effectively on demand, are justified and have the right to be, since the ability to present our products, work with our consumers, a competent marketing approach form the popularity of this boutique, store or salon among buyers and provide them with a steady consumer demand ... Ultimately, well-thought-out principles of presenting the properties of the goods, the choice of your consumer, the correct design of boutiques and their windows - all this will significantly influence the effective results of their work. The same fully applies to the children's assortment.

Assortment formation is a problem of specific goods, their separate series, determination of the relationship between "old" and "new" goods, goods of single and serial production, "science-intensive" and "ordinary" goods, materialized goods, or licenses and know-how. When forming the assortment, problems of prices, quality, guarantees, service arise, whether the manufacturer is going to play the role of a leader in creating fundamentally new types of products or is forced to follow other manufacturers.

The formation of the assortment is preceded by the development of the assortment concept by the enterprise. It is a directed construction of an optimal assortment structure, a product offer, while, on the one hand, the consumer requirements of certain groups (market segments) are taken as a basis, and on the other, the need to ensure the most efficient use of raw materials, technological, financial and other resources by the enterprise. in order to produce products with low costs.

The assortment concept is expressed in the form of a system of indicators characterizing the possibilities of optimal development of the production assortment of a given type of goods. These indicators include: a variety of types and varieties of goods (taking into account the typology of consumers); the level and frequency of the assortment renewal; the level and ratio of prices for goods of this type, etc.

The assortment formation system includes the following main points:

- ♦ determination of current and future needs of

buyers, analysis of the ways of using shoes and peculiarities of purchasing behavior in the relevant market;

♦ assessment of existing competitors' analogues;

♦ a critical assessment of the products manufactured by the enterprise in the same range as in paragraphs. 1 and 2, but from the point of view of the buyer;

♦ deciding which products should be added to the assortment, and which ones should be excluded from it due to changes in the level of competitiveness; whether it is necessary to diversify products at the expense of other areas of production of the enterprise, which go beyond its established profile;

♦ consideration of proposals for the creation of new models of footwear, improvement of existing ones;

♦ development of specifications for new or improved models in accordance with the requirements of buyers;

♦ exploring the possibilities of producing new or improved models, including issues of prices, costs and profitability;

♦ testing (testing) footwear, taking into account potential consumers in order to find out their acceptability in terms of key indicators;

♦ development of special recommendations for the production departments of the enterprise regarding quality, style, price, name, packaging, service, etc. in accordance with the results of the tests carried out, confirming the acceptability of the characteristics of the product or predetermining the need to change them;

♦ assessment and revision of the entire range.

Assortment planning and management is an integral part of marketing. Even well-thought-out sales and advertising plans will not be able to neutralize the consequences of mistakes made earlier in assortment planning.

The optimal assortment structure should ensure maximum profitability, on the one hand, and sufficient stability of economic and marketing indicators (in particular, sales volume), on the other hand.

Achieving the highest possible profitability is ensured through constant monitoring of economic indicators and timely decision-making on adjusting the assortment.

The stability of marketing indicators is ensured, first of all, due to constant monitoring of the market situation and timely response to changes, and even better, the adoption of proactive actions. It is important that there are not too many product names. For the majority of Russian enterprises, the main reserve for assortment optimization still lies in a significant reduction in the assortment range. Too large assortment has a bad effect on economic indicators - there are many positions that cannot even reach the break-even level in terms of sales. As a result, the overall profitability drops dramatically. Only the exclusion of unprofitable and marginal items from the assortment can give the company an increase in overall profitability by 30-50%.

In addition, a large assortment diffuses the strength of the company, makes it difficult to competently offer the product to customers (even the sales staff are not always able to explain the difference between a particular item or name), and scatters the attention of end consumers.

Here it will be appropriate to recall the psychology of human perception of information. The reality is that the average person is able to perceive no more than 5 - 7 (rarely up to 9) semantic constructs at a time. Thus, a person, making a choice, first chooses these same 5 - 7 options based on the same number of criteria. If the seller offers a larger number of selection criteria, the buyer begins to feel discomfort and independently weeds out criteria that are insignificant from his point of view. The same happens when choosing the actual product. Now imagine what happens if there is a hundred practically indistinguishable (for him) goods in front of a person, and he needs to buy one. People in such a situation behave as follows: either they refuse to buy at all, since they are not able to compare so many options, or they prefer what they have already taken (or what seems familiar). There is another category of people (about 7%), lovers of new products, who, on the contrary, will choose something that they have not tried yet.

Thus, from the point of view of the buyer (in order to ensure a calm choice from the perceivable options) the assortment should consist of no more than 5 - 7 groups of 5 - 7 items, i.e. the entire assortment from the point of view of perception should be optimally comprised of 25 - 50 items. If there are objectively more names, then the only way out is additional classification.

It is generally accepted that the customer wants a wide range of products. This widest assortment is often referred to even as a competitive advantage. But in fact, it turns out that for a manufacturer a wide assortment is hundreds of product names, and for a consumer - 7 items is already more than enough.

And thus, the consumer does not need a wide assortment at all, but the variety he needs.

If the company adheres to a wide assortment approach, then it is enough to conduct a sales analysis, look at the statistics to make sure that the sales leaders are 5-10, at most 15% of the items, all other positions are sold very little, the demand for them is small, although the costs differ little from costs for sales leaders. It turns out a situation when several items "feed" the entire wide assortment of the enterprise. And this is far from always justified from the point of view of ensuring the completeness of the assortment (the favorite argument of sellers), that is, the presence

of various names to cover the maximum possible options for customer needs. In practice, it turns out that completeness is fully ensured, even if the existing assortment is reduced by half or even three times. The main thing in this case is to correctly classify all the goods and to ensure that the assortment includes goods from each possible group of this classification. Moreover, the more grounds a company can identify for classification, the more balanced the decision will be. So, the classification of goods can be according to the satisfied needs of customers, according to the functional purpose of the goods, according to the benefit for the company.

Of particular importance in such a situation is the role played by certain positions in the assortment. For this, products can be classified into the following groups:

A - the main group of goods (which bring the main profit and are in the stage of growth);

B - a supporting group of goods (goods that stabilize sales revenue and are in the stage of maturity);

B - strategic group of goods (goods designed to ensure the future profit of the company);

D - tactical group of goods (goods designed to stimulate sales of the main product group and are in the stage of growth and maturity);

D - a group of products under development (products that are not present on the market, but ready to enter the market);

E - goods leaving the market (which do not bring profit and must be removed from production, withdrawn from the market).

After that, it is necessary to determine the share of each group in the total volume of production. For a stable position of the company in the assortment structure: group of goods A and B must be at least 70%.

Thus, this makes it possible to evaluate the existing assortment set in the company and, correlating it with the profit received, to assess the correctness of the assortment planning, its balance.

In addition, an increase in the volume of goods of groups that generate the main income will not always contribute to an increase in the company's profits. Here it is important to pay attention to the remainder of unsold goods (what increase it will give and the possibility of its further sale).

Production planning is one of the important problems of assortment policy. In economics, forecasting of future expenses and income is widely used on the basis of calculating the cost of production at variable costs. The essence of this method lies in the fact that the costs of the enterprise are divided into fixed and variable depending on the degree of their response to changes in the scale of production.

The basis of fixed costs is the costs associated with the use of fixed assets (fixed capital). These include the cost of depreciation of fixed assets, rental of production facilities, as well as the salaries of management personnel, deductions for the social needs of these personnel. The basis of variable costs is the costs associated with the use of working capital (working capital). These include the cost of raw materials, supplies, fuel, wages of production workers and deductions for their social needs.

It should be emphasized that the total fixed costs, being a constant value and not depending on the volume of production, can change under the influence of other factors. For example, if prices rise, then the total fixed costs also rise.

The method of calculating the amount of coverage provides for the calculation of only variable costs associated with the production and sale of a unit of production. It is based on the calculation of the average variable costs and the average coverage, which is gross profit and can be calculated as the difference between the product price and the sum of variable costs. Limiting the cost of production to only variable costs simplifies rationing, planning, control due to a sharply reduced number of cost items. The advantage of this method of accounting and costing is also a significant reduction in the labor intensity of accounting and its simplification.

When applying the method of calculating the amount of coverage, it is advisable to use indicators such as the amount of coverage (marginal income) and the coverage ratio.

The amount of coverage (marginal income) is the difference between sales revenue and the total amount of variable costs. The amount of coverage can be calculated in another way - as the sum of fixed costs and profit. The calculation of the amount of coverage allows you to determine the funds of the enterprise, received by it in the sale of manufactured products in order to reimburse fixed costs and make a profit. Thus, the amount of coverage shows the overall level of profitability of both the entire production and individual products: the higher the difference between the selling price of a product and the sum of variable costs, the higher the amount of coverage and the level of profitability.

Coverage ratio is the proportion of coverage in sales revenue or the proportion of average coverage in the price of a product.

It is also important to determine at what volume of sales the gross costs of the enterprise will be recouped. To do this, it is necessary to calculate the break-even point at which the proceeds or the volume of production are accepted, ensuring that all costs are covered and zero profit. Those. the minimum volume of proceeds from the sale of products is revealed, at which the level of profitability will be more than 0.00%. If the company receives more revenue than the break-even point, then it is working profitably. By comparing these two values of revenue, you can estimate the allowable decrease in revenue (sales volume) without the danger of being at a loss. The

revenue corresponding to the break-even point is called the threshold revenue. The volume of production (sales) at the break-even point is called the threshold volume of production (sales). The threshold sales volume depends on the price of the products sold.

To estimate how much the actual revenue exceeds the breakeven revenue, it is necessary to calculate the safety margin (the percentage deviation of the actual revenue from the threshold). To determine the impact of a change in revenue on a change in profit, the production leverage ratio is calculated. The higher the effect of production leverage, the more risky from the point of view of reducing profits is the position of the enterprise.

To divide the total costs into fixed and variable costs, we will use the high and low points method, which assumes the following algorithm:

- among the data on the production volumes of various types of footwear and the costs of its production, the maximum and minimum values are selected;
- the differences between the maximum and minimum values of the volume of production and costs are found;
- the rate of variable costs for one product is determined by referring the difference in cost levels for a period to the difference in levels of production for the same period;
- the total value of variable costs for the maximum and minimum volume of production is determined by multiplying the rate of variable costs for the corresponding volume of production;
- the total amount of fixed costs is determined as the difference between all costs and the amount of variable costs (example 1).

The minimum volume of production falls on the release of model A - 500 pairs, the maximum - for the release of model B - 1600 pairs.

The minimum and maximum costs for the production of footwear models A and B, respectively, amount to 179,465 rubles. (358.93⊙ 500) and 428 180 rubles. (428.18⊙ 1000). The difference in the levels of the volume of production is 1100 pairs (1600 - 500), and in the levels of costs - 248715 rubles. (428180 - 179465). The variable cost rate per item is 226.1 (248715/1100). The total amount of variable costs for the minimum production volume is 113,045 rubles. (226.1⊙ 500), and for the maximum volume - 361,760 rubles. (226.1⊙ 1600). The total amount of fixed costs 179465 - 113045 = 66420, 428180 - 361760 = 66420. Thus, for our example, the value of fixed costs will be 66420 rubles. and they will be distributed among the manufactured types of footwear in proportion to the total cost of each type of product.

The profit from the sale of Model A is negative. However, before deciding to exclude this type of footwear from the assortment, it is necessary to calculate the profit from the sale of all manufactured types of products. At the same time, it is important that the amount of revenue exceeds the amount of variable costs.

We will summarize the solution of the example in table 14.

Let's see how the profit of the enterprise will change when the production of unprofitable model A is abandoned. In this case, the company's revenue will decrease by the volume of revenue from the sale of this type of product and its size will be 753508 rubles. (951008 - 197500).

At the same time, the total costs of the enterprise will also be reduced by the amount of variable costs required for the production and sale of brand A footwear. This value will be equal to 164,290 rubles. Since fixed costs do not depend on the amount of revenue, the abandonment of the production of brand A shoes will not affect their total value. Thus, the total costs of the enterprise without the production of footwear brand A will amount to 633,842 rubles. (798132 - 164290). And the organization will not receive a loss in the course of its activities (753508 - 633842 = 119666 rubles). The use of the method of calculating the average size of the coverage allows you to make a decision on the feasibility of further production of brand A footwear. The average coverage for both brands of footwear is positive. If the company reduces the output of brand A footwear by one unit, it will lose 66.6 rubles. from covering fixed costs. The exclusion from production of the entire volume of production of this brand will lead to losses in the amount of 33,300 rubles. (500 · 66.6). From the foregoing, we can conclude that brand A shoes should be kept in stock.

Table 14. Solution example 1

Index	Value, rub.
Revenues from sales	951008
Variable costs	798132
Fixed costs	66420
Coverage amount, 1 - 2	152876
Coverage ratio, 4/1	0.16
Threshold revenue, 3/5	415125
Safety factor,%, (1 - 6) / 1 * 100	56.35

Profit	86456
Production Leverage Effect, 4/8	1.77

Thus, it is not always advisable to make a decision based only on the value of total costs and profit per unit of production, because in the end result the enterprise may lose profit. Now let's consider the situation (example 2), when the company plans to release a new product - model B in the amount of 1,700 pairs at a price of 467.40 rubles. for 1 pair. However, the production facilities of this organization are suitable for the production of only 4,000 pairs of shoes. And if it is going to start producing Model B shoes, it will have to abandon the production of 500 pairs of other models. The question arises: should we introduce new products into the assortment, and if so, what products should be cut back?

The average value of variable costs for a new type of product is 375.34 rubles. Then the average coverage is 92.06 rubles. (467.40 - 375.34). The increase in the company's profit due to the production of model B footwear will be 156,502 rubles. (1700◌ 92.06). Among all types of footwear produced by the enterprise, model B has the smallest average coverage (66.6 rubles). If you abandon the production of 500 pairs of shoes, then the organization will lose 33,300 rubles, at the same time, the enterprise will additionally receive 156,502 rubles from the production of brand B footwear. The profit of the enterprise from the change in the assortment will be 123202 rubles. (156502 - 33300). Let us trace how the safety factor, the effect of production leverage and the profit of the enterprise will change if model B is included in the assortment of footwear production (table 15).

Table 15. Solution example 2

Index	Value, rub.
Revenues from sales	1745588
Variable costs	1520478
Fixed costs	66420
Coverage amount, 1-2	225110
Coverage ratio, 4/1	0.13
Threshold revenue, 3/5	515046
Safety factor,%, (1-6) / 1 * 100	70.49
Profit	158690
Production Leverage Effect, 4/8	1.42

The above data show that as a result of the renewal of the assortment, the position of the enterprise has improved:

– profit increased from 86456 rubles. up to 158 690 rubles;

– safety margin increased by 14.14% (70.49 - 56.35);

– the effect of production leverage decreased by 0.35 points (from 1.77 to 1.42).

Thus, in the costing system for variable costs, profit is reflected as a function of sales, and in the full distribution system it depends on both production and sales.

Both considered systems have their own advantages and disadvantages. So, for example, when the volume of production exceeds the volume of sales, a higher profit will be shown in the system of full cost allocation. In the case when the volume of sales exceeds the volume of production, the higher profit will be reflected in the calculation of the cost price at variable costs. However, when calculating the cost of variable costs, information for making a decision can be obtained with significantly fewer calculations. The choice is up to the management of the enterprise in order to ensure its stable position in the conditions of unstable demand with timely and effective actions. This is especially important in the manufacture of the entire assortment of children's shoes and when working with customers - with mothers and children, creating all the conditions for them to satisfy their interests.

In a market economy, in order to survive in a constantly changing economic environment, shoe enterprises need to focus on the target audience; an increase in the amount of profit as a result of an increase in the volume of sales of products, a decrease in its cost price and an increase in product quality.

In order to get the desired profit in conditions when the prices for shoes and production volumes are dictated by the market, the company always faces the choice of what products and how much to produce in terms of the costs of manufacturing them and taking into account the solvency of potential buyers. The availability of high-quality, competitive footwear is a

prerequisite for the highly efficient functioning of a footwear enterprise.

An important criterion for the competitiveness of footwear on the market is its cost with its corresponding quality and the purchasing power of the population. The main criterion for the viability and profitability of an enterprise is profit; in order to increase losses, first of all, it is necessary to reduce the cost of shoes. The change in the total cost, which includes all the costs of manufacturing and selling footwear, depends on the ratio of changes in costs for each calculation item.

An important factor affecting the level of costs for the production of footwear is the change in the assortment and technological process (tables 16-19).

Table 16. Financial results of the activity of the enterprise selling children's shoes

Month	Release, steam	Costs, rub.			Cost price, rub.	Commercial products (at wholesale price), rub.	Profit, RUB
		Basic and auxiliary materials	Main and additional RFP with SVVF	Overheads			
I quarter - spring (56) - (15 + 19 + 22)							
January 3909699.75	7095	1756438.2	414631.8	1,738,629.75	3909699.75	4321564.5	411864.75
February 4976286.35	8987	2,248,821.72	525200.28	2202264.35	4976286.35	5473981.7	497695.35
March 5734226.3	10406	2576109.36	608,126.64	2549990.3	5734226.3	6338294.6	604068.3
I quarter 14620212.4	26488	6581369.28	1547958.72	6490884.4	14620212.4	16133840.8	1513628.4
II quarter - summer (62) - (21 + 20 + 21)							
April 5587132.32	11088	2305971.36	614496.96	2666664.0	5587132.32	6098400.0	511267.68
May 5321078.4	10560	2196163.2	585235.2	2539680.0	5321078.4	5808000.0	486921.6
June 5587132.32	11088	2305971.36	614496.96	2666664.0	5587132.32	6098400.0	511267.68
II quarter 16495343.04	32736	6808 105.92	1814229.12	7873008	16495343.04	18004800.0	1509457
III quarter - autumn (66) - (24 + 23 + 22)							
July 5933010.3	10122	2964936.24	697911.9	2270162.16	5933010.3	6533751.0	600740.7
August 6498058.9	11086	3247311.12	764379.7	2486368.08	6498058.9	7156013.0	657954.1
September 6215534.6	10604	3106123.68	731145.8	2378265.12	6215534.6	6844882.0	629347.4
III quarter 18646603.8	31812	9318371.04	2193437.4	7134795.36	18646603.8	20534646.0	1888042.2
IV quarter - winter (64) - (21 + 21 + 22)							
October 7266070.35	9135	3934992.6	874858.95	2456218.6	7266070.35	8138371.5	872301.15
November 7266070.35	9135	3934992.6	874858.95	2456218.6	7266070.35	8138371.5	872301.15
December 7612073.7	9570	4122373.2	916518.9	2573181.6	7612073.7	8525913.0	913839.3
IV quarter 22144214.4	2740	11992358.4	2666236.8	7485618.8	22144214.4	24802656.0	2658441.6
For the year 71,906,373.64	188876	34700204.64	8221862.04	28984306.56	71906373.64	79475942.8	7569569.16

Table 17. Financial results of the enterprise for the sale of women's shoes

Month	Release, steam	Costs, rub.			Cost price, rub.	Commercial products (at wholesale price), rub.	Profit, RUB
		Basic and auxiliary materials	Main and additional RFP with SVVF	Overheads			
I quarter - spring (56) - (15 + 19 + 22)							
January 2856754.8	3060	1,671,861.6	455695.2	729198	2856754.8	3241519.2	384764.4
February 3618556.08	3876	2117691.36	577213.92	923650.8	3618556.08	4105924.32	487368.24
March 4205419.04	4488	2,447,575.68	688352.96	1069490.4	4205419.04	4754228.16	548809.12
I quarter 10680729.92	11424	6237128.64	1721262.08	2722339.2	10680729.92	12101671.68	1420941.76
II quarter - summer (62) - (21 + 20 + 21)							
April 4,503,549.54	5334	2819819.1	451363.08	1232367.36	4503549.54	5198409.72	694860.18
May 4289094.8	5080	2685542.0	429869.6	1173683.2	4289094.8	4950866.4	661771.6
June 4503549.54	5334	2819819.1	451363.08	1232367.36	4503549.54	5198409.72	694860.18
II quarter 13296193.88	15748	8325180.1	1,332,595.76	3638417.92	13296193.88	15347685.84	2051491.96
III quarter - autumn (66) - (24 + 23 + 22)							
July 4,038,068.37	3801	2,461,033.47	528681.09	1048353.81	4038068.37	4831793.19	793724.82
August 4422646.31	4163	2,695,417.61	579031.67	1148197.03	4422646.31	5304452.97	881806.66
September 4230357.34	3982	2578225.54	553856.38	1,098,275.42	4230357.34	5061878.58	831521.24
III quarter 12691072.02	11946	7734676.62	1,661,569.14	3294826.26	12691072.02	15185635.74	2494563.72
IV quarter - winter (64) - (21 + 21 + 22)							
October 7169000.58	3402	5261975.46	750413.16	1156611.96	7169000.58	8649 142.74	1480 142.16
November 7169000.58	3402	5261975.46	750413.16	1156611.96	7169000.58	8649 142.74	1480 142.16
December 7510381.56	3564	5512545.72	786 147.12	1211688.72	7510381.56	9061006.68	1550625.12
IV quarter 21848382.72	10368	16036496.64	2,286,973.44	3524912.64	21848382.72	26359292.16	4510909.44
For the year 58516378.54	49489	38333482.0	7002400.42	13180496.02	58516378.54	68994285.42	10477906.88

Table 18. Financial results of the enterprise for the sale of men's shoes

Month	Release, steam	Costs, rub.			Cost price, rub.	Commercial products (at wholesale price), rub.	Profit, RUB
		Basic and auxiliary materials	Main and additional RFP with SVVF	Overheads			
I quarter - spring (56) - (15 + 19 + 22)							
January 3,662,091.75	4275	2417213.25	602860.5	642618.0	3662691.75	4419495	756803.23
February	5415	3061803.45	763,623.3	813982.8	4639409.55	5598027	958617.45

4639409.55							
March 5371947.9	6270	3545246.1	884195.4	942506.4	5371947.9	6481926	1109978.1
I quarter 13674049.2	15960	9024262.8	2250679.2	2399107.2	13674049.2	16499448	2825398.8
II quarter - summer (62) - (21 + 20 + 21)							
April 3,794,943.0	5901	2338035.21	638,960.28	817347.51	3794343.0	4450711.23	656368.23
May 3613660.0	5620	2226700.2	608533.6	778426.2	3613660.0	4238772.6	625112.6
June 3,794,343.0	5901	2338035.21	638,960.28	817347.51	3794343.0	4450711.23	656368.23
II quarter 11202346	17422	6902770.62	1886454.16	2413121.22	11202346	13140195.06	1937849.06
III quarter - autumn (66) - (24 + 23 + 22)							
July 4792159.49	5292	3219403.02	429542.11	1143214.35	4792159.49	6099030	1,306,870.51
August 5249555.63	5796	3526012.83	470450.89	1252091.91	5249555.63	6679890	1430334.37
September 5020357.56	5544	3372707.92	449996.5	1197653.14	5020357.56	6389460	1369102.44
III quarter 15061072.68	16632	10118123.77	1349989.5	3592959.4	15061072.68	19168380	4107307.32
IV quarter - winter (64) - (21 + 21 + 22)							
October 4,419,723.0	4389	3032008.98	661466.19	726247.83	4419723.0	5207109.6	787386.6
November 4419723.0	4389	3032008.98	661466.19	726247.83	4419723.0	5207109.6	787386.6
December 4630186.0	4598	3176390.36	692964.58	760831.06	4630186.0	5455067.2	824881.2
IV quarter 13469632.0	13376	9240408.32	2015896.96	2213326.72	13469632.0	15869286.4	2399654.4
For the year 53,407,099.87	63390	35285565.51	7503019.82	10618514.54	53407099.87	64677309.46	11270209.59

Table 19. Impact of the sale of footwear on the financial condition of the enterprise

Men's footwear					
Volume sales,%	100%	80%	60%	48%	40%
Profit / Losses per month, rub.	824881.2	207739.04	190596.51	0	-126545.78
Tax on profit, 20%	164976.22	41547.8	38119.3	-	-
Tax on property, 2.2%	3483.3	3483.3	3483.3	3483.3	3483.3
Net profit / Losses for the month, rub.	656421.7	162708	148994	- 3483.3	- 3483.3
Profit / Losses for the year, rub.	9898574.4	2,492,868.48	2287158.12	0	-1518549.36
Net profit / loss for the year, rub.	7877060.4	1952496	1787928	- 41799.6	- 41799.6
Women's shoes					
Volume sales,%	100%	80%	60%	44%	40%
Profit / Loss	1550625.12	998162.35	445699.56	0	-106763.19

per month, rub.					
Tax on profit, 20%	310 125.02	199632.47	89139,912	-	-
Tax on property, 2.2%	3483.3	3483.3	3483.3	3483.3	3483.3
Net profit / Losses for the month, rub.	1237017	795046.6	353076.3	- 3483.3	- 3483.3
Profit / Losses for the year, rub.	18607501	11977948	5348395	0	- 1281158.28
Net profit / loss for the year, rub.	14844204	9540559	4236916	- 41799.6	- 41799.6
Children's shoes					
Volume sales,%	100%	90%	83%	80%	-
Profit / Losses per month, rub.	511267.68	495905.15	0	-416365.49	-
Tax on profit, 20%	102253.54	9918103	-	-	-
Tax on property, 2.2%	3483.3	3483.3	3483.3	3483.3	-
Net profit / Losses for the month, RUB	405,530.84	39668929	- 3483.3	- 3483.3	-
Profit / Losses for the year, rub.	6135212	49590515	0	- 4996385.88	-
Net profit / loss for the year, rub.	4866370	39668929	- 41799.6	- 41799.6	-

The data of tables 16 - 19 indicate that with 100% of the sale of footwear, compensation is provided for the costs not only for the production and sale of footwear, but also a net profit remains, which indicates the effective operation of the enterprise for the analyzed month, as well as the correct marketing assortment policy of the enterprise. ... This result of work will allow the company to distribute net profit for the formation of a financial reserve, payment of dividends, development of production, financing of social programs, etc.

When the sale of this type of footwear is not in full, then such a result negatively affects the performance of the enterprise. In this case, the presence of leftovers of non-salable footwear reduces the total amount of revenue, increases costs and leads to additional costs for storing goods.

In addition, from tables 18-21 it can be seen that if men's shoes are sold below 48%, women's - 44%, and children's shoes - 83%, then the enterprise suffers losses, which leads to the need to reduce the volume of production, delay the payment of wages to workers, etc. ...

If such a situation arises, it is necessary to attract borrowed funds to cover the costs and organize the subsequent production of products, which at the moment is associated with certain difficulties: the interest on the loan has been significantly increased (up to 20%), the loan repayment period has been reduced, etc., leading to an even greater increase production costs.

In market conditions of management, an effective management system requires a rational organization of sales activities, which largely determines the level of use of production means at an enterprise, an increase in labor productivity, a decrease in production costs, an increase in profits and profitability. This is due to the fact that the sales activity is not only the sale of finished footwear, but also the orientation of production to meet the solvency of buyers' demand and active work in the market to maintain and generate demand for the company's products, and the organization of effective distribution and promotion channels.

In a dynamically changing market environment, the results of an enterprise, including a footwear one, largely depend on the effective results of the production, sales, financial and marketing policies of the enterprise itself, which creates the basis for bankruptcy protection and a stable position in the domestic market.

Thus, when developing an assortment policy, shoe enterprises should focus on both external (price and consumer niche, competing enterprises, market environment, etc.) and internal factors, such as sales volume, profitability, coverage of basic costs, etc. However, it is impossible take into account and provide for all situations that may arise when selling shoes, i.e. some shoe models are not in demand at a certain stage. In this case, another, usually not advertised side of marketing should appear: if the shoes, even without taking into account the requirements of the market, have already been produced, then they must be sold. For this purpose, in order to respond to the lower prices of competitors, it is necessary to reduce too large stocks, get rid of

damaged, defective shoes, eliminate leftovers, attract a large number of consumers, and stimulate shoe consumption using discounts.

In addition to using discounts, an enterprise can initiate a price reduction in case of underutilization of production capacities, a reduction in market share under the onslaught of competition from competing enterprises, etc. In this case, the enterprise takes care of its costs, developing measures to reduce them by improving equipment and technology, introducing new types of materials into production, and constantly improving the quality of products. And all this requires large financial costs from enterprises, but, nevertheless, it contributes to an increase in the competitiveness of certain types of leather goods and the enterprise as a whole. in addition, the larger the number of footwear products produced, the more production costs decrease, which leads to a decrease in prices, and most importantly, creates such conditions for the functioning of the market that would not allow other competing enterprises to enter it and would cause a positive reaction from consumers.

The assortment policy is to develop the implementation of decisions regarding the range (names) of products, the variety of assortments of one name, the need to expand the assortment.

To determine the volumes of the expected demand by consumers for new products and to ensure a balance between supply and demand for shoe enterprises, it is advisable to use the method of expert assessments.

A survey of experts (trade and industry specialists) is carried out when samples of new products are ready for examination.

Based on the results of the expert survey, a final report is drawn up, where the expected volumes of demand for the company's products are determined. On the basis of these forecast recommendations, a survey of consumers and the production capabilities of the enterprise, an optimal assortment structure is drawn up.

Thus, on the basis of these criteria of competitiveness, we have proposed a system of indicators for assessing the value of any enterprise for the development of the regions of the Southern Federal District and the North Caucasus Federal District, which is presented in Table 20.

Assessment of the innovation and investment potential of the enterprise. The innovative potential is determined by the number of branches included in the enterprise. The larger the number of branches, the higher the level of competition, and competition is an incentive for innovation. In addition, the more innovatively active branches within an enterprise, the higher the innovative potential of the enterprise itself.

*Investment potential*characterized by the number of levels of product processing in the value chain. The level of processing is the number of types of products that are created at the enterprise along the production chain, determined on the basis of the OKONKh code in accordance with the Classifier of the branches of the national economy. The higher the degree of product processing, the more investment is required in such an enterprise.

Table 20. Indicators for assessing the importance of the enterprise for the development of the regions of the Southern Federal District and the North Caucasus Federal District

Directions for assessing the value of an enterprise for the regional economy	Indicators for assessing the importance of an enterprise for the development of regions
1. Promoting the growth of budget revenues	Added value created by the enterprise
2. Promoting general employment	Number of employees at the enterprise
3. Promoting the formation of a positive foreign trade balance	The volume of export of products by the enterprise
4. The contribution of the enterprise to the economy of the regions of the Southern Federal District and the North Caucasus Federal District	The share of the enterprise in the structure of production of the regions of the Southern Federal District and the North Caucasus Federal District

To assess the effectiveness of the developed innovative technological processes, it is proposed to use the efficiency coefficient (Kef), the value of which must be considered as the value of the concordance coefficient for assessing the results of a priori ranking (W), which varies from 0 to 1. If its value tends to one, then this means that the manufacturer managed to find the most optimal solution to the innovative technological process, but if its value tends to zero, then an analysis of the reasons for such an unsatisfactory result and a search for errors that provoked such a result, and ways to eliminate the mistakes are required.

The efficiency factor of the technological process is calculated by the formula:

$$К_{эф} = К_{ПТ} \times К_{з}^{\,i} \cdot P_s \cdot C \cdot S_{общ} \cdot З_{ф} \times Т_{б.у} \cdot Пр \cdot R \cdot З_{1р\,т.п} \cdot З_{усл.пер.ед} \cdot З_{усл.пос.ед}. \quad (5)$$

Labor productivity (CPT)

$$К_{ПТ} = \frac{P}{Н_{выр}}, \qquad (.6)$$

where P is the flow assignment, steam; $Н_{выр}$ - design production rate, par.

Loading of workers (Кзi)

$$К_з^i = \frac{Я_{сд}^{Р}}{Я_{сд}^{Ф}}, \qquad (7)$$

where $Я_{сд}^{Р}$ - the estimated number of workers, people; $Я_{сд}^{Ф}$ - the actual number of workers, people.

Footwear production per 1 m2 (Ps)

$$P_s = \frac{P}{S_{пр}}, \qquad (8)$$

where $S_{пр}$ - production area, m2.

Equipment cost per unit of flow task (C)

$$C = \frac{T}{P}, \qquad (9)$$

where T is the cost of equipment, rubles.

Total price (Stotal)

$$S_{общ} = \sum_{i=1}^{n} S^i, \qquad (10)$$

where S^i - the rate for the i-th operation; n is the number of operations.

Расчет оптовой цены (Ц=Цена/1,18)

Модель	Цена	Оптовая цена
Зимние сапоги (модель А)	1400,00	1186,44
Осенние ботинки (модель Б)	1360,00	1152,54
Весенние полуботинки	1220,00	1033,90
Летние сандалии (модель Г)	890,00	754,24

Расчет основных показателей

Показатель \ Модель	Зимние сапоги (модель А)	Осенние ботинки (модель Б)	Весенние полуботинки (модель В)	Летние сандалии (модель Г)
Прибыль (руб.)	171,59	401,59	250,25	102,47
Рентабельность (%)	16,91	53,48	31,93	15,72
Затраты на рубль товарной продукции (руб.)	85,54	65,16	75,80	86,41
Затраты условно-переменные (руб.)	787,03	557,61	601,64	492,29
Затраты условно-постоянные (руб.)	227,82	193,34	182,01	159,48
Точка безубыточности (пар)	26954,41	13096,67	19486,94	28331,98
Запас финансовой прочности (%)	42,96	67,50	57,89	39,12
Выручка от реализации (руб.)	56 066 408,64	46 447 362,00	47 848 892,00	35 099 312,64
Валовая выручка (руб.)	8 583 395,54	16 483 643,02	11 940 489,91	5 068 877,96
Чистая прибыль(руб.)	6 677 881,73	12 824 274,27	9 289 701,15	3 943 587,05

Чистая прибыль предприятия за год по всем моделям (руб.) = 32 735 444,20

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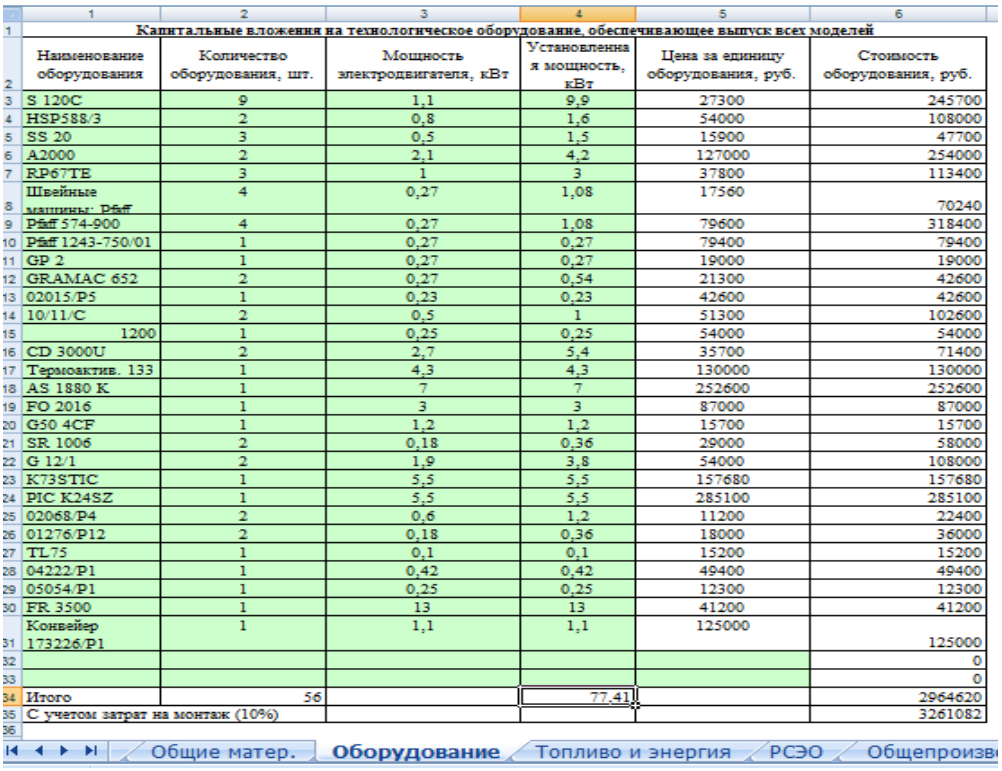
Figure 21. Calculation of the main economic indicators (sheet "Cost")



Капитальные вложения на технологическое оборудование, обеспечивающее выпуск всех моделей

Наименование оборудования	Количество оборудования, шт.	Мощность электродвигателя, кВт	Установленная мощность, кВт	Цена за единицу оборудования, руб.	Стоимость оборудования, руб.
S 120C	9	1,1	9,9	27300	245700
HSP588/3	2	0,8	1,6	54000	108000
SS 20	3	0,5	1,5	15900	47700
A2000	2	2,1	4,2	127000	254000
RP67TE	3	1	3	37800	113400
Швейные машины: Pfaff	4	0,27	1,08	17560	70240
Pfaff 574-900	4	0,27	1,08	79600	318400
Pfaff 1243-750/01	1	0,27	0,27	79400	79400
GP 2	1	0,27	0,27	19000	19000
GRAMAC 652	2	0,27	0,54	21300	42600
02015/P5	1	0,23	0,23	42600	42600
10/11/C	2	0,5	1	51300	102600
1200	1	0,25	0,25	54000	54000
CD 3000U	2	2,7	5,4	35700	71400
Термоактив. 133	1	4,3	4,3	130000	130000
AS 1880 K	1	7	7	252600	252600
FO 2016	1	3	3	87000	87000
G50 4CF	1	1,2	1,2	15700	15700
SR 1006	2	0,18	0,36	29000	58000
G 12/1	2	1,9	3,8	54000	108000
K73STIC	1	5,5	5,5	157680	157680
PIC K24SZ	1	5,5	5,5	285100	285100
02068/P4	2	0,6	1,2	11200	22400
01276/P12	2	0,18	0,36	18000	36000
TL75	1	0,1	0,1	15200	15200
04222/P1	1	0,42	0,42	49400	49400
05054/P1	1	0,25	0,25	12300	12300
FR 3500	1	13	13	41200	41200
Конвейер 173226/P1	1	1,1	1,1	125000	125000
					0
					0
Итого	56		77,41		2964620
С учетом затрат на монтаж (10%)					3261082

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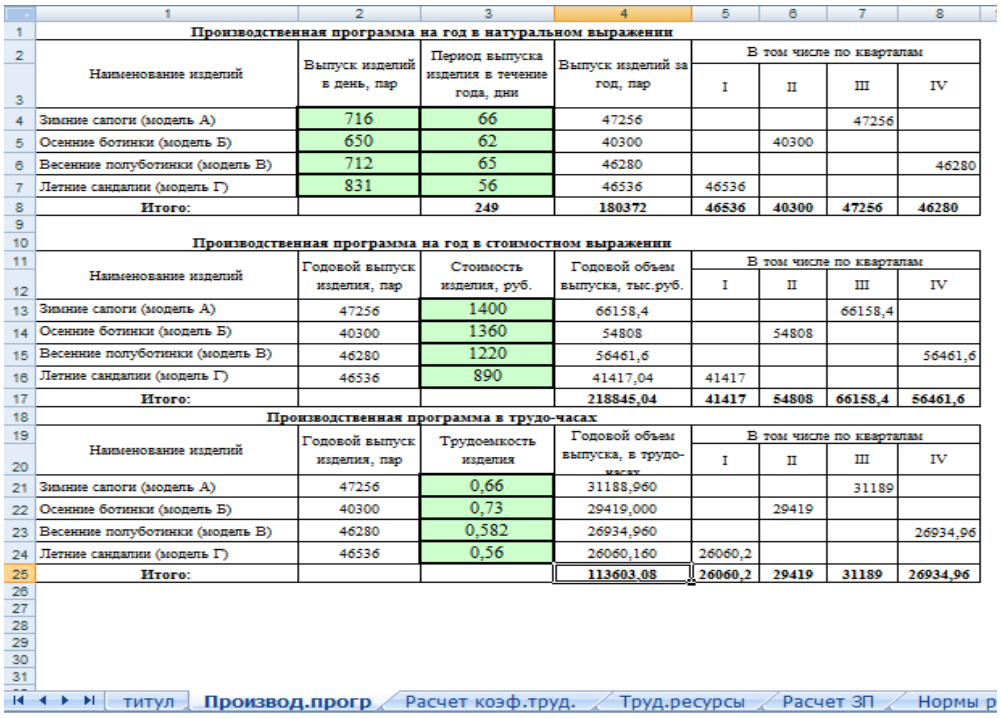
Figure 22 Calculation of expenses for the maintenance and operation of equipment (sheet "Equipment")



Производственная программа на год в натуральном выражении

Наименование изделий	Выпуск изделий в день, пар	Период выпуска изделия в течение года, дни	Выпуск изделий за год, пар	В том числе по кварталам			
				I	II	III	IV
Зимние сапоги (модель А)	716	66	47256			47256	
Осенние ботинки (модель Б)	650	62	40300		40300		
Весенние полуботинки (модель В)	712	65	46280				46280
Летние сандалии (модель Г)	831	56	46536	46536			
Итого:		**249**	**180372**	**46536**	**40300**	**47256**	**46280**

Производственная программа на год в стоимостном выражении

Наименование изделий	Годовой выпуск изделия, пар	Стоимость изделия, руб.	Годовой объем выпуска, тыс.руб.	В том числе по кварталам			
				I	II	III	IV
Зимние сапоги (модель А)	47256	1400	66158,4			66158,4	
Осенние ботинки (модель Б)	40300	1360	54808		54808		
Весенние полуботинки (модель В)	46280	1220	56461,6				56461,6
Летние сандалии (модель Г)	46536	890	41417,04	41417			
Итого:			**218845,04**	**41417**	**54808**	**66158,4**	**56461,6**

Производственная программа в трудо-часах

Наименование изделий	Годовой выпуск изделия, пар	Трудоемкость изделия	Годовой объем выпуска, в трудо-часах	В том числе по кварталам			
				I	II	III	IV
Зимние сапоги (модель А)	47256	0,66	31188,960			31189	
Осенние ботинки (модель Б)	40300	0,73	29419,000		29419		
Весенние полуботинки (модель В)	46280	0,582	26934,960				26934,96
Летние сандалии (модель Г)	46536	0,56	26060,160	26060,2			
Итого:			**113603,08**	**26060,2**	**29419**	**31189**	**26934,96**

титул | Производ.прогр | Расчет коэф.труд. | Труд.ресурсы | Расчет ЗП | Нормы р

Figure 23. Calculation of the production program of the enterprise for the year (sheet "Production program")

The financial strength margin is calculated according to the following relationship (Зфп)

$$Зфп = \frac{B_2 - T_{б.у}}{B_2} \cdot 100 \ (\%), \ (11)$$

where B2 is the output of marketable products in the

planned period in physical terms of the pair; Tb.y - break-even point, pairs.

The break-even point is determined by the formula (Tb.y):

$$TB.y = \frac{З_{усл.пост.}}{Ц_{ед} - З_{усл.пер.ед.}} \text{ (pairs), (12)}$$

here Zusl.post is the total fixed costs of a unit of production, rubles; Price - unit price, rubles; Zusl.trans.units - total variable costs of a unit of production, rubles.

The profit per unit of production (Pr) is determined by the following relationship:

$$Pr = Tsopt - C, \quad (13)$$

where Tsopt is the wholesale price of a unit of production (selling price minus value added tax in the amount of 10% for children's shoes and 18% for other types), rubles; C is the total cost of a unit of production, rubles.

Product profitability (R) is determined by the following formula:

$$R = \frac{П_р}{С} \cdot 100 (\%), \quad (14)$$

here Pr is the profit from the sale of a unit of production, rubles; C is the total cost of a unit of production, rubles.

Costs per 1 rub. commercial products (Z1r tp) are determined by the following formula:

$$31p \text{ etc.} = \frac{С}{Ц_{опт}} \cdot 100 (\text{cop}), \quad (15)$$

where C is the total cost of a unit of production, rubles; Tsopt - the wholesale price of a unit of production (selling price minus value added tax in the amount of 10% for children's shoes and 18% for other types), rubles.

Conditional variable costs (total variable costs of production of a unit of output) (Zusl.trans.units) is defined as

Zusl. lane unit = Spol - (5 tbsp floor + 6 tbsp floor + 7 tbsp floor + 8 tbsp floor + 9 tbsp floor). (16)

Conditionally fixed costs (total fixed costs of production of a unit of production) (Zusl.p. units)

Zusl. village unit = Spol - (1st stage of floor + 2 stage of floor + 3 stage of floor + 4 stage of floor). (17)

Also, software was developed to select the optimal power.

At the same time, the criteria that have the greatest impact on the cost of the finished product were justifiably chosen as the criteria for a reasonable choice of the optimal power when forming the algorithm, namely:

– losses on wages per unit of production, rubles;
– shoe production, 1 m2;
– percentage of workload of workers,%;
– labor productivity of one worker, a couple;
– unit reduced costs per 100 pairs of shoes, rubles;
– the cost of equipment per unit of flow assignment (C)
– total price (Stotal);
– financial strength margin (Zfp);
– break-even point (TB.y);
– unit profit (Pr);
– product profitability (R);
– costs for 1 rub. marketable products (31p tp);
– conditionally variable costs (Zusl. per.units);
– conditionally fixed costs (Zusl. settlement units).

From the above criteria, in our opinion, the manufacturer has the opportunity to give preference to those that, from his point of view, would guarantee him the production of import-substituting, competitive and demanded products, namely:

- labor productivity of 1 worker is the most important labor indicator. All the main indicators of production efficiency and all labor indicators, to one degree or another, depend on the level and dynamics of labor productivity: production, the number of employees, wage expenditure, the level of wages, etc., to increase labor productivity, the introduction of a new techniques and technologies, extensive mechanization of labor-intensive work, automation of production processes, advanced training of workers and employees, especially when introducing innovative technological processes based on universal and multifunctional equipment;

- specific reduced costs - an indicator of the comparative economic efficiency of capital investments used when choosing the best option for solving technological problems;

- reduced costs - the sum of current costs, taken into account in the cost of production, and one-time capital investments, the comparability of which with current costs is achieved by multiplying them by the standard coefficient of efficiency of capital investments;

- the margin of financial strength (Zfp) shows how many percent the company can reduce the volume of sales without incurring losses;

- the break-even point allows (Tb.y) to determine the minimum required volume of product sales, at which the enterprise covers its costs and operates without loss, giving no profit, but also does not suffer losses, that is, this is the minimum volume of production at which equality of income is achieved from sales and production costs;

- profit (loss) from the sale of products (Pr) is defined as the difference between the proceeds from the sale of products in the current prices of VAT and excise taxes and the costs of its production and sale;

- the profitability of production (R) reflects the relationship between the profit from the sale of a unit of production and its cost;

- conditionally fixed costs (total fixed costs of

production of a unit of production) (Zusl.pos.units), which change in proportion or almost proportionally to the change in the volume of production (1st - costs of raw materials and materials; 2st - costs of auxiliary materials; 3st - costs of fuel and energy for technological needs; 4st - the cost of additional and basic wages of production workers with insurance contributions to non-budgetary funds);

- conditionally variable costs (total variable costs of production of a unit of output) (Zusl.trans.units), which do not depend or almost do not depend on changes in the volume of production (5st - costs of preparation and development of production; 6 st - costs of costs for the maintenance and operation of equipment; 7st - expenses for general production needs; 8st - expenses for general business expenses, they, together with conditionally fixed costs, make up the production cost; 9st - expenses for commercial expenses. fixed costs, make up the full cost, that is, conditionally variable costs can be defined as full cost - conditionally fixed costs, and vice versa, conditionally fixed costs can be defined as full cost - conditionally variable costs);

- costs for 1 rub. commercial products show the relative amount of profit per ruble of operating costs, that is, this is the ratio of the unit cost to the wholesale price, which characterizes the effectiveness of measures taken to increase the competitiveness and demand for products in demand markets.

To convert the dimensional estimates of indicators into dimensionless, it is proposed to use the index method. Indices of dimensionless indicators are determined by the formula (6.18) for positive indicators with a positive trend - growth (for example, profitability of sold products, labor productivity) and by formula (6.19) for negative indicators with a positive trend - a decrease (for example, depreciation of fixed assets, excess of balances of finished products in the warehouse in comparison with the norm, staff turnover rate), taken mainly from the indicators that form the cost of production:

$$O_i = X_i / X_i^{\max}, \qquad (18)$$

$$O_i = X_i^{\min} / X_i, \qquad (19)$$

where Oi - dimensionless (index) assessment of the i-th indicator of the competitiveness of the enterprise; Xi is the value of the i-th dimensional indicator for assessing the competitiveness of the enterprise; Ximax is the maximum value of the i-th dimensional indicator for assessing the competitiveness of an enterprise; Ximin is the minimum value of the i-th dimensional indicator for assessing the competitiveness of an enterprise.

Stage 1. *Assessment of the competitiveness of the product.* It is carried out for light industry goods according to their demand in the domestic market.

Stage 2. *Calculation of the generalizing indicator of the competitiveness of the enterprise.* It is proposed to determine a quantitative assessment of the competitiveness of an enterprise according to the following formula:

$$K_П = \sum_{i=1}^{m} \alpha_i \times O_i, \qquad (20)$$

where KP is an assessment of the competitiveness of the enterprise in percent;α_i - the significance of the i-th indicator of competitiveness in percent; Oi - index (dimensionless) assessment of the i-th indicator of competitiveness; m - the number of indicators for assessing the competitiveness of the enterprise.

The values of assessing the competitiveness of an enterprise can theoretically vary from 0 to 100:

$$Kp = 0 \div 100. \qquad (21)$$

For the qualitative characteristics of the obtained assessments of competitiveness, a scale for assessing the quality level is required. In economic practice, they use the principle of constructing scales with an equal step, progressive and regressive scales. Progressive and regressive scales are most often used for material incentives. We believe that the most appropriate is a scale with an equal step, since it, firstly, corresponds to solving a practical problem (specification of the qualitative level of competitiveness), and secondly, it is easy to build and use. The scale step is defined as 100 (maximum score): 4 (number of levels) = 25. A choice of another step value is also possible, which is determined by the goals and objectives that the enterprise itself forms:

$$Kef = K1\ K2\ K3\ K4\ K5\ K6\ K7\ K8\ K9\ K10\ K11\ K12, \qquad (22)$$

where Kef is the weighting coefficient of assessing the effectiveness of innovative technological processes, formed for the production of competitive and demanded products:

K1 - the weight of labor productivity (PT);

K2 - the weight of the workload of workers (ZR);

K3 - weight of footwear production (Ps);

K4 is the weight of the equipment cost per unit of flow assignment (C);

K5 - the weight of the total price per unit of production (Stotal);

K6 - the weight of the financial strength (Zfp);

K7 - the weight of the break-even point (Tb.y);

K8 - the weight of the profit of a unit of production (Pr);

K9 - weight of product profitability (R);

K10 - the weight of costs per 1 ruble of marketable products (31р.т.п);

K11 - the weight of conditionally variable costs (total variable costs of production of a unit of production) (Zusl.per.units);

K12 - the weight of conditionally fixed costs (total fixed costs of a unit of production) (Zusl.pos.units)

As a result of the calculation, the following scale was obtained for assessing the qualitative level of competitiveness of the enterprise (table 23)

Table 23. Scale for assessing the quality level of competitiveness of an enterprise

Percentage score	Quality level
from 0 to 24.9	very low
from 25.0 to 49.9	short
from 50.0 to 74.9	average
from 75.0 to 100	high

The cost of services and products -these are the current costs of the enterprise for the production and sale of services and products, expressed in monetary terms. When calculating the cost of services and productsktsiand all expenses of the enterprise are classified according to various criteria:

- depending on the nature of their attribution to the cost of services and products, they are divided into 2 groups: direct and indirect.

*Straight*such costs are called that can be directly attributed to a particular type of product when producing more than one of its types (materials, fuel, energy).

Indirect - costs that cannot be directly attributed to the cost of various types of products in the manufacture and repair of more than one of its types, and then distributed between them in proportion to other costs of funds or labor.

- depending on the change in the volume of production, all costs are divided into conditionally variable (proportional) and conditionally constant (disproportionate).

*To conditional variables*includes costs that change in proportion or almost proportionally to changes in the volume of production (costs of materials and energy for technological purposes, wages of production workers, etc.).

*To conditionally constant*include expenses that do not depend or almost do not depend on changes in the volume of production (depreciation deductions from the cost of fixed assets, rent, expenses for the maintenance of buildings and structures, salaries of managers, specialists and employees, etc.):

- on the economic role in the production process: basic and overhead;

- by composition (homogeneity): single-element, complex;

- by the frequency of occurrence: current and one-time.

One-time - the cost of preparation and development of production new types of productsktsiand, the costs associated with the launch of new production facilities and more:

- for participation in the production process: industrial and commercial;

- by efficiency: productive, unproductive.

*Costs are considered productive*for the production of products of the established quality with rational technology and organization of production.

*Overhead costs*are the result of shortcomings in the technology of organizing production (losses from downtime, product rejects, overtime payment, etc.).

Production costs are planned and non-productive costs are not planned.

*Calculation of the cost of services and products*is the definition of the cost of products and services provided, carried out by separate cost items. The calculation of the cost price during the calculation is carried out on standard calculation units.Itsy...

Standard cost estimates are compiled according to the nomenclature of costing items:

1. Raw materials and basic materials (taking into account transport and procurement costs and excluding sold waste).
2. Supporting materials.
3. Fuel and electricity for technological purposes.
4. Basic and additional wages of production workers with insurance contributions to off-budget funds.
5. Expenses for preparation and development of production.
6. Equipment maintenance and operating costs (RSEO).
7. General production costs (shop floor costs).
8. General running costs.
9. Compulsory property insurance payments.

Production cost

10. Commercial (non-production) expenses.

Full cost price.

Estimated production costs and financial results

To determine the total amount of all planned costs in the enterprise and to interconnect the indicators of cost price, profit and profitability with other indicators, an estimate of the cost of production by economic elements is made, which includes the costs of all structural divisions of the enterprise involved in the performance of services (production of productsktsiand).

*Cost estimate*is considered a consolidated document characterizing the monetary value of all material, energy costs necessary to ensure the implementation of the plan for the release of products and services.

The costs included in the estimate are grouped as follows.

Costings

1. Raw materials and basic materials.

2. Supporting materials.
3. Purchased products and semi-finished products.
4. Fuel from the side.
5. Energy from the outside.
6. Basic and additional wages of industrial production personnel (PPP) with deductions for the unified social tax.
7. Depreciation of fixed assets for full restoration.
8. Other expenses.

*Formation of financial results.*The final financial result (profit or loss) is made up of the financial result from the sale of products (works, services), fixed assets and other property of the enterprise and income from non-sales operations, reduced by the amount of expenses on these operations.

*Profit Loss)*from the sale of products (works, services) and goods is determined as the difference between the proceeds from the sale of products (works, services) in current prices excluding VAT and excise taxes and the costs of its production and sale.

Planned profit (Ppl):

$$П_{пл} = (В \cdot Ц) - (В \cdot С), \qquad (23)$$

where B is the output of marketable products in the planned period in physical terms; P - price for 1 pair of shoes (unit of production) minus VAT and excise taxes - this is the wholesale price; C is the cost of a complete unit of production.

Profit 1 pair (P1):

$$P1 = Tsopt - C1, \quad (24)$$

here Tsopt is the wholesale price of 1 pair; C1 - the cost of 1 pair.

Product profitability reflects the relationship between profit from product sales and its cost.

It shows the relative amount of profit for each ruble of current expenses and is determined by the formula:

$$R_{п} = \frac{П_{р}}{З} \cdot 100, \quad (25)$$

where is the profitability of the product; Pr - profit from the sale of products; 3 - costs (cost); $R_{п}$

$$R = \frac{П}{С/С} \cdot 100(\%),$$

- calculation for 1 pair. (6.26)

Revenue from product sales(works and services) is determined either as it is paid for, or as the goods are shipped (works and services are performed) and settlement documents are presented to the buyer (customer).

*To income*relate:

- income received on the territory of the Russian Federation and abroad from equity participation in the activities of other enterprises, dividends on shares and income on bonds and other securities owned by the enterprise;
- income from property lease;
- income from the assessment of inventories and finished products;
- fines, penalties, penalties and other types of sanctions awarded or recognized by debtors for violation of the terms of business contracts, as well as income from compensation for damages;
- profit of previous years, revealed in the reporting year;
- other income from operations directly related to the production and sale of products (works and services).

To costs and losses ***relate:***

- costs of maintaining mothballed production facilities and facilities (except for costs reimbursed from other sources);
- losses not compensated by the culprits from downtime due to external reasons;
- losses from markdowns of inventories and finished goods;
- losses on operations with packaging;
- legal costs and arbitration costs;
- awarded or recognized fines, penalties, forfeits and other types of sanctions for violation of the terms of business contracts, as well as expenses for compensation for damages;
- losses of previous years revealed in the current year;
- non-compensated losses as a result of fires, accidents, other emergencies caused by extreme conditions; non-compensated losses from natural disasters (destruction and damage to industrial stocks of finished products and other material assets, losses from production interruptions, etc.), including costs associated with the elimination of the consequences of natural disasters; losses from embezzlement, the perpetrators of which have not been established by court decisions.

Break-even analysis allows you to determine the minimum required volume of product sales, at which the company covers its costs and operates at break-even, giving no profit, but also does not suffer losses.

In its most general form, the activity of any enterprise is carried out according to the "costs - production process - profit" scheme.

The break-even point (Tb.y) is determined by calculation according to the following formula

$$Т_{б.у} = \frac{УПЗ \cdot Количество\ продукции}{Ц - УППЗ}, \qquad (27)$$

where UPZ - conditionally fixed costs per unit of production, rubles; UPPZ - conditionally variable costs per unit of production, rubles; P - unit price without VAT, rubles.

To build a break-even graph, you should draw up an equation of the following form:

$at_1 = ah;$

$y2 = ao + ax,$

where y1 is revenue, rubles; y2 - costs (full cost) for the production of products, rubles;*a*- unit price without VAT, rubles; x - the planned volume of sales of products, pairs; a0 is the sum of the UPZ; a1 - the sum of the UPPZ per unit of production, rubles.

The financial strength margin (Zf) shows how much you can reduce the volume of production, working at a breakeven, not giving profit, but not suffering losses:

$$З_{ф} = \frac{В - Т_{б.у}}{В} \cdot 100\ (\%), \quad (28)$$

where Tb.y is the break-even point.

When calculating dimensionless estimates of the indicators of the competitiveness of enterprises using formulas (6.18) and (6.19) using software, it becomes necessary to formulate these very criteria as their evidence base. So, for example, the profit per unit of production is calculated depending on the profitability of the product, that is, first the size of the profitability is formulated from 5 to 25%, and then the size of the profit per unit of production is laid down. The same feature exists with the definition of the labor productivity criterion, because at first they use innovative technological processes formed on the basis of universal and multifunctional equipment, the maintenance of which should be entrusted to highly qualified and responsible performers who empathize with the overall result of the entire technological cycle, guaranteeing them the production of demanded and competitive products that are in high demand among consumers on domestic markets. Calculation of conditionally fixed costs for the production of a unit of product and conditionally variable costs for the production of a unit of production is interconnected with the peculiarities of organizing the production of competitive and demanded products, including for children. The analysis of the results of the activities of leading foreign manufacturers confirms the fact that if the conditionally fixed costs make up 20 - 40% of the production cost, then, naturally, the conditionally variable costs make up 60 - 80%. At the same time, it is again necessary to focus on the peculiarity of the production of products for children, when both profit, profitability, conditionally fixed costs and conditionally variable costs are formed on the basis of the implementation of the requirements of technical regulations and regulatory documents and acts that guarantee the safety of life when using them. And if this is due to the need to produce them with such stringent characteristics, the state and manufacturers are obliged to be interested in each other and provide manufacturers with compensation for the additional costs of observing them and guarantee that the manufactured products will not harm the health of children.

Of course, if the criterion for the loss of wages per unit of production should tend to zero, and the volume of footwear production from 1 m2 - to its maximum possible value, and the cost of 1 ruble of marketable output should tend to their minimum possible value and the cost of equipment per unit of flow assignment also strives for its minimum possible value, and other criteria - for their maximum possible value - in the aggregate, a dimensionless assessment of the effectiveness of the developed innovative technological processes (K) should always strive for unity and thereby always confirm that the designed innovative technological process for the enterprise for the production of it import-substituting products will be successful in their activities for the benefit of the population of those regions where they will operate, being city-forming for these small medium-sized cities and in which all branches of government are interested - both federal and regional and municipal.

The characteristics of competitive advantages in the production of the entire assortment of footwear for making a decision on its manufacture, calculated using the same software product, are shown in Table 24.

Table 24. Calculation components for the entire range of footwear

Indicators	Type of shoe	Types of shoes			
		Spring	Summer	Autumn	Winter
Unit cost products, rub.	Mens	856.77	643.72	998.5	1007.07
	Womens	933.51	844.31	1062.37	2107.29
	Children	551.05	503.89	586.15	795.41
Basic costs materials, rub.	Mens	541.61	378.64	623.16	660.42
	Womens	523.71	511.6	618.52	1503.57
	Children	235.78	200.05	280.76	415.5
Costs for auxiliary materials, rub.	Mens	23.82	17.57	28.16	30.4
	Womens	22.65	17.05	24.31	43.16
	Children	11.78	7.92	12.16	15.26
Salary	Mens	141.02	108.28	161.1	150.71

pay	Womens	148.92	84.62	139.09	220.58
	Children	58.44	55.42	68.95	95.77
Unit profitability, rub.	Mens	10.75	14.65	13.36	15.12
	Womens	11.88	13.37	16.42	17.11
	Children	9.53	8.39	9.19	10.72
Expenses for 1 rub. commodity products, rub.	Mens	82.88	85.35	86.64	84.88
	Womens	88.12	86.63	83.57	82.89
	Children	90.47	91.62	90.8	89.28

Thus, the software developed by the authors for assessing the effectiveness of the formed innovative technological processes for the production of an import-substituting assortment of footwear, taking into account the calculated calculation components for the production of the planned assortment, makes it possible to make a justified decision on its launch, a decision on its balance, guaranteed demand and ensuring the enterprise a stable financial position.

In addition, the developed software allows the regional and municipal branches of government, together with future manufacturers of the entire assortment of footwear in single-industry towns, to form the volume of footwear production not only taking into account their needs, but also to guarantee enterprises a stable financial condition by providing them with stable TPP, that is, they will the foundations have been created for the formation of new jobs with the simultaneous solution of all social problems, which, unfortunately, are characteristic today of most small and medium-sized cities of the Russian Federation.

The choice of technology capable of effectively realizing the intended goals in the conditions of the fiercest competition will provide a guarantee that the developed range of footwear will be chosen by the buyer and will allow the company to get the maximum profit.

To solve this problem, it is necessary to most widely use the injection method, which ensures the manufacture (production) of the entire assortment of high quality footwear with different profitability of certain types of footwear to meet the demand of various groups of the population.

In the cost of footwear production, the largest share is made up of costs for raw materials and basic materials, and then for wages and depreciation deductions.

The authors believe that the advantages of direct casting of the bottom of the shoes will undoubtedly interest manufacturers to produce such an assortment that will not only meet the trends of fashion, but most importantly, satisfy the demand, taking into account their functional requirements for the shoes themselves, namely, for athletes, for recreation. , for the elderly, for people with minor pathological deviations of the foot, creating comfortable conditions for them and meeting the demand for it, covering the deficit by varying the price of it.

One of the conditions for the competitiveness of an enterprise is the organization of effective interaction with parties interested in the successful functioning of this enterprise. Each enterprise, even small ones, has several groups of subjects with different interests, with which it can be in temporary or permanent cooperation. The research of the authors is devoted to the study of these interests, ways of solving emerging problems between external and internal participants, and the establishment of relationships between partners in order to guarantee to all interested parties the implementation of the main principle - the interests of all parties are legitimate and require their satisfaction and respect.

To make a profit, the company must constantly monitor the proportion of costs for the manufacture of the proposed multi-assortment footwear production.

This is possible only if the heads of enterprises implement modern technological solutions based on the use of multifunctional and universal equipment and at the same time it is necessary to remember that the innovative technological solution itself should not be costly, that is, on the one hand, provide the enterprise stable technical and economic indicators and guaranteeing them demand not only in the sales markets of the regions of the Southern Federal District and the North Caucasus Federal District, but in the regions of other districts of Russia and be attractive to foreign consumers. But on the other hand, consumers should have a choice to compare the price niche for the offered products with analogues of foreign firms, and always have priority. This will be possible with the formation of production based on the use of innovations and innovative activities with the involvement of nanotechnology and nanomaterials, which create the opportunity for manufacturers to use injection molding methods for the manufacture of shoe bottoms.

The use of the injection method will allow the enterprise in the conditions of market relations to receive such a volume of profit that will allow it not only to firmly maintain its position in the sales market for its shoes, but also to ensure the dynamic development of its production in a competitive environment, this is especially important in the

manufacture of the entire assortment of children's shoes ...

Making a profit is the main goal of any entrepreneurial activity. Currently, there is fierce competition in the field of business and entrepreneurship, it is necessary to be able to calculate future profits, calculate possible losses.

The net profit indicator reflects the final result of the firm's activities, shows how profitable the implementation of this type of activity is. Net profit is used by entrepreneurs to increase working capital, form various funds and reserves, as well as for reinvestment in production. The amount of net profit directly depends on the size of the gross profit, as well as on the amount of tax payments.

A number of taxes are related to the financial results of economic activities of enterprises: income tax, property tax.

The rules for taxation with income tax are defined in Chapter 25 of the Tax Code of the Russian Federation:

1) Corporate income tax rate (Federal tax) is 20%, of which: 2% is credited to the federal budget, and 18% to the regional budget.

2) Tax on property of organizations (Regional tax), ypays from the property that is "on the balance sheet" of the organization. V mainly, these are fixed assets and intangible assets.

The maximum rate is set by the Tax Code of the Russian Federation (Chapter 30) and is 2.2% of the tax base - the average annual value of the property.

Property tax calculation:

$$НИ_{пр} = \frac{ОФ_{срг} \cdot СН_{и}}{100}, \quad (29)$$

where OFsrg - residual value of fixed assets, thousand rubles; SNi - property tax rate (SNi = 2.2%).

Calculation of income tax and net profit

Income tax (NPR) is determined by the formula:

$$НПР \frac{(ПП - НИ) \cdot СН_{пр}}{100}, \quad (30)$$

where CHпр - income tax rate,%, (CHпр = 20%); ПР - profit of the enterprise, thousand rubles; NI - property tax, thousand rubles

Net profit Prch is determined by the formula:

$$Пр_{ч} = Пр - НИ - НПР \ldots \quad . (31)$$

Table 25. Summary characteristics of the results of the survey of respondents - children, their parents, buyers and manufacturers on the assessment of the competitive potential of shoe enterprises in the regions of the Southern Federal District and the North Caucasus Federal District

Results of the survey of children	Parent Survey Results	Customer survey results	Producer survey results
2 - Quality of children's shoes	3 - Quality of children's shoes	3 - Quality of children's shoes	3 - Quality of children's shoes
1 - Toe shape	8 - Comfort	9 - Comfort	4 - Functionality of children's shoes
11 - Weight	1 - Weight	6 - Compliance with the direction in fashion	9 - Comfort
5 - Comfort	7 - Price	7 - Price	7 - Price
13 –- Materials for the bottom of shoes	5 - Flexibility	4 - Functionality of children's shoes	6 - Compliance with the direction in fashion
22 - Compliance with the direction in fashion	4 - Color fastness of materials used for shoe uppers to dry and wet friction and to perspiration	1 - Weight	5 - Characteristics of materials for the upper of the shoe
4 - Price of children's shoes	2 - Color	5 - Characteristics of materials for the upper of the shoe	1 - Weight
21 - Variety of assortment of shoes for children in shops and shopping centers	6 - Strength of fastening of the bottom of the shoe	8 - Characteristics of materials for the bottom of the shoe	8 - Characteristics of materials for the bottom of the shoe
6 - The level of service for parents and children in shops and shopping centers	11 - Warranty period for children's shoes	2 - Color	2 - Color

7 - Color	10 - Maintainability	15 - What types of children's shoes are preferred: autumn	12 - Maintainability
9 - The height of the heel is up to 40 mm	9 - Deformation of the toe and heel	10 - The height of the heel of the shoe - up to 40 mm	13 - Warranty period for children's shoes
15 - Place of sale of shoes for children - interior of a store, or a shopping center		14 - What types of children's shoes are preferred: winter	10 - The height of the heel of the shoe - up to 40 mm
8 - Warranty period for children's shoes		11 - The height of the heel of the shoe is over 40 mm	11 - The height of the heel of the shoe - over 40 mm
16 - What types of children's shoes are preferred: winter		12 - Maintainability	
18 - What types of children's shoes are preferred: spring		18 - Strength of fastening of the bottom of the shoe	
12 - Repairability of children's shoes, its expediency		16 - What types of children's shoes are preferred: spring	
3 - Flexibility of children's shoes		13 - Warranty period for children's shoes	
10 - The height of the heel of the shoe is over 40 mm		17 - What types of children's shoes are preferred: summer	
17 - What types of children's shoes are preferred: autumn			
20 - Strength of fastening of the bottom of the shoe			
14 - Materials for the upper shoe			
19 - What types of children's shoes are preferred: summer			
0.16 <W <0.69	0.52 <W <0.94	0.47 <W <0.91	0.33 <W <0.84

Table 26. Summary characteristics of the results of the survey of respondents - children, their parents, buyers and manufacturers on the assessment of the competitive potential of shoe enterprises in the regions of the Southern Federal District and the North Caucasus Federal District, but without heretics, whose opinion does not coincide with the majority of respondents who participated in the survey

Results of the survey of children	Parent Survey Results	Customer survey results	Producer survey results
2 - Quality of children's shoes	7 - Price	6 - Compliance with the direction in fashion	3 - Quality of children's shoes
5 - Comfort	8 - Comfort	9 - Comfort	4 - Functionality of children's shoes
11 - Weight	1 - Weight	7 - Price	7 - Price
22 - Compliance with the direction in fashion	3 - Quality of children's shoes	3 - Quality of children's shoes	9 - Comfort
16 - What types of children's shoes are preferred: winter	5 - Flexibility	15 - What types of children's shoes are preferred: autumn	6 - Compliance with the direction in fashion
6 - The level of service for parents and children in shops and shopping centers	4 - Color fastness of materials used for shoe uppers to dry and wet friction and to perspiration	1 - Weight	12 - Maintainability

21 - Variety of assortment of shoes for children in shops and shopping centers	2 - Color	14 - What types of children's shoes are preferred: winter	5 - Characteristics of materials for the upper of the shoe
4 - Price of children's shoes	6 - Strength of fastening of the bottom of the shoe	4 - Functionality of children's shoes	8 - Characteristics of materials for the bottom of the shoe
7 - Color	10 - Maintainability	5 - Characteristics of materials for the upper of the shoe	1 - Weight
1 - Toe shape	11 - Warranty period for children's shoes	11 - The height of the heel of the shoe is over 40 mm	13 - Warranty period for children's shoes
12 - Repairability of children's shoes, its expediency	9 - Deformation of the toe and heel	2 - Color	2 - Color
8 - Warranty period for children's shoes		8 - Characteristics of materials for the bottom of the shoe	10 - The height of the heel of the shoe - up to 40 mm
13 –- Materials for the bottom of shoes		10 - The height of the heel of the shoe - up to 40 mm	11 - The height of the heel of the shoe - over 40 mm
15 - Place of sale of shoes for children - interior of a store, or a shopping center		16 - What types of children's shoes are preferred: spring	
18 - What types of children's shoes are preferred: spring		17 - What types of children's shoes are preferred: summer	
3 - Flexibility of children's shoes		18 - Strength of fastening of the bottom of the shoe	
19 - What types of children's shoes are preferred: summer		12 - Maintainability	
14 - Materials for the upper shoe		13 - Warranty period for children's shoes	
9 - The height of the heel is up to 40 mm			
10 - The height of the heel of the shoe is over 40 mm			
20 - Strength of fastening of the bottom of the shoe			
17 - What types of children's shoes are preferred: autumn			
0.16 <W <0.69	0.52 <W <0.94	0.47 <W <0.91	0.33 <W <0.84

Conclusion

The results of studies to assess the competitive potential of shoe enterprises in the regions of the Southern Federal District and the North Caucasus Federal District with the participation of parents, children, buyers and manufacturers are presented in table. 6.26 - 6.27. Their analysis confirmed the importance of marketing services in the formation of sustainable demand for domestic products within the framework of their import substitution. And the more often these services interact with producers and consumers, the more effective the results of these enterprises will be in ensuring they have a stable demand for their products, obtaining stable technical and economic indicators of their activities, forming the image and social security of the population of small and medium-sized cities as city-forming enterprises, in the success of which manufacturers, regional and municipal branches of government are also interested, and luck today is more than ever necessary for all participants in the survey to assess the competitive potential of shoe enterprises located in the regions of the Southern Federal District and the North Caucasus Federal District.

The validity of the main provisions, conclusions and recommendations formulated in this work is

confirmed by the use of simulation methods and research tools that correspond to the current state of science. To achieve this goal, namely, to ensure the competitiveness of footwear produced in the regions of the two districts, the effectiveness of the use of innovative technological processes, modern technologies, mathematical models, applied software packages, theories of synergy, network cooperation, the immanent consciousness of the and competitive products

The authors set out the concept of import substitution of light industry products through the competitiveness of enterprises and through the competitiveness of products, ensuring their relevance, attractiveness and pretentiousness in order to create the preconditions for sustainable demand among consumers in the regions of the Southern Federal District and the North Caucasus Federal District. This is possible if producers ensure the demand for products based on assortment policies while socially protecting consumers' interests, guaranteeing them a stable financial position, price niche and a policy of effective cash flow, creating enterprises to obtain stable technical and economic indicators.

The desire of researchers to draw the attention of federal, regional and municipal branches of government to revising the concept of the roadmap and the strategy for the development of light industry in Russia until 2025, approved by the government, is justified. Unfortunately, it lacks the main thing - the role and importance of participation in its implementation by the authorities of all levels, without whose support both the roadmap and the strategy for the development of light industry are only intentions and nothing more. The lack of promises and responsible persons deprived them of being obligatory for these very branches of power, and without their interested participation it is simply impossible to achieve the declared results. Another weighty doubt about its performance is not to have a significant impact on the restoration of light industry enterprises in the regions and municipal formations as city-forming ones, in order to restore social stability and security to small and medium-sized cities of Russia, that is, to restore them the role that they played for these same municipal and regional formations, of which there are so many in Russia, including in the regions of two Federal Districts - the Southern Federal District and the North Caucasus Federal District.

The implementation of all the proposed measures presupposes the active participation of these very branches of government, but, especially, regional and municipal, so that, creating new jobs in small and medium-sized cities, guarantee their population all social conditions for a decent life, ensuring their funding, including work preschool and school organizations, medical and cultural institutions, distracting young people from the street and other undesirable phenomena. And the appearance on the demand markets of products in demand with a price niche acceptable for most consumers in these regions will reduce the migration of the population from these regions precisely by financing all socially significant institutions.

Forming import substitution, regional and municipal authorities, supporting the heads of enterprises in the implementation of their tasks and filling the markets with products that are in demand, especially for children and socially vulnerable groups of the population of these regions, they - these very authorities - will directly implement their promises to voters expressed by them. and create confidence among the population of these regions in their future, which, ultimately, will provide the population of small and medium-sized cities with a decent life.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
	GIF (Australia) = 0.564	ESJI (KZ) = 9.035	IBI (India) = 4.260
	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2021 **Issue:** 11 **Volume:** 103
Published: 03.11.2021 **http://T-Science.org**

QR – Issue QR – Article

Oybek Jumaboevich Khudayberdiev
Navoi State Mining Institute,
Navoi city, Republic of Uzbekistan
khudayberdiyevo@mail.ru

INTERVAL VERSION OF MATHEMATICAL MODELING OF THE MELT LEVEL OF A CONTINUOUS CASTING MACHINE

Abstract: *In this article, an interval version of mathematical modeling of the melt level of a continuous casting machine has been developed. For optimal control, the constancy of the level of the melt in the intermediate tank and in the crystallizer, the dynamics of this process is considered as a logical-dynamic system (LDS). Because the level of the melt is in a certain interval, then these parameters are considered as interval values. As a result, the process of the melt level of the continuous casting machine is modeled in the context of interval analysis.*

Key words: *melt level, batcher, stopper, intermediate tank, crystallizer, pulling stands, interval, interval values, real variant, interval variant, logical predicates, logic-dynamic system, differential equation.*

Language: *Russian*

Citation: Khudayberdiev, O. J. (2021). Interval version of mathematical modeling of the melt level of a continuous casting machine. *ISJ Theoretical & Applied Science, 11 (103),* 163-169.

Soi: http://s-o-i.org/1.1/TAS-11-103-7 ***Doi***: https://dx.doi.org/10.15863/TAS.2021.11.103.7

Scopus ASCC: *2600.*

ИНТЕРВАЛЬНЫЙ ВАРИАНТ МАТЕМАТИЧЕСКОГО МОДЕЛИРОВАНИЯ УРОВНЯ РАСПЛАВЫ МАШИНЫ НЕПРЕРЫВНОГО ЛИТЬЯ ЗАГОТОВОК

Аннотация: *В данной статье разработан интервальный вариант математического моделирования уровня расплавы машины непрерывного литья заготовок. Для оптимального управления постоянство уровня расплавы в промежуточной ёмкости и в кристаллизаторе, динамика данного процесса рассматривается как логико-динамическая система (ЛДС). Т.к. уровень расплавы находится в некотором промежутке, то эти параметры рассматриваются как интервальные величины. В итоге, технологический процесс уровня расплавы машины непрерывного литья заготовок моделируется в контексте интервального анализа.*

Ключевые слова: *уровень расплавы, дозатор, стопор, промежуточная ёмкость, кристаллизатор, тянущие клети, интервал, интервальные величины, вещественный вариант, интервальный вариант, логические предикаты, логико-динамическая система, дифференциальное уравнение.*

Введение

Особенностью математических моделей систем управления является то, что они не только содержат априорную информацию о ее динамических свойствах, необходимую для изучения поведения системы в целом, но также отражают процессы получения и обработки текущей информации о цели системы, состоянии объекта и воздействиях среды для принятия решения по оказанию на объект надлежащего управляющего воздействия. Рассматривается математическая модель систем управления процесса непрерывной разливки стали. Он состоит в том, что жидкий металл из ковша или через промежуточное разливочное устройство непрерывно заливается в верхнюю часть водоохлаждаемого кристаллизатора. После затвердевания металла у стенок кристаллизатора непрерывный слиток при помощи тянущих механизмов перемещается вниз, увлекая за собой формирующийся слиток. При дальнейшем движении по технологическому тракту заготовка разрезается с помощью режущих аппаратов на заданные мерные длины, которые

транспортирующимися механизмами передаются в прокатный цех или на склад готовой продукции.

Машины непрерывного литья заготовок (МНЛЗ) отличаются большим разнообразием. Различия МНЛЗ состоят в основном в направлении технологической оси машины, т.е. в расположении слитка в процессе литья: вертикальном, радиальном, горизонтальном или наклонном с движущимся или неподвижным кристаллизатором. Одним из распространённых типов установок являются вертикальные МНЛЗ, который изображен на рисунке 1, заимствованный из [1].

Поступление металла из главного сталеразливочного ковша *1* в промежуточную ёмкость *3* происходит через донный разливочный стакан *2*, задросселированный специальным огнеупорным стержнем-стопором *5*. Промежуточная ёмкость предотвращает попадание шлака в кристаллизатор *4*, обеспечивает подачу спокойной струи жидкой стали и позволяет регулировать поступление металла в кристаллизатор. Подача металла из промежуточной ёмкости в кристаллизатор осуществляется разливкой через донные стаканы-дозаторы *2'* и регулированием стока металла через донный стакан с помощью стопора *5'*. Стопор и донный стакан в последнем случае образуют специфический регулирующий орган, так называемую стопорную пару.

Целью разработки модели МНЛЗ, по утверждению авторов [1], является выбор управления, обеспечивающего:

а) постоянство уровня расплава в промежуточной ёмкости h_2. Это позволяет стабилизировать условия всплывания неметаллических включений, выделения газов, а также стабильность гидростатического напора, определяющего условия истечения струи металла в кристаллизатор;

b) *постоянство уровня металла в кристаллизаторе h_3, что обеспечивает стабильность высоты заполнения кристаллизатора жидким металлом.*

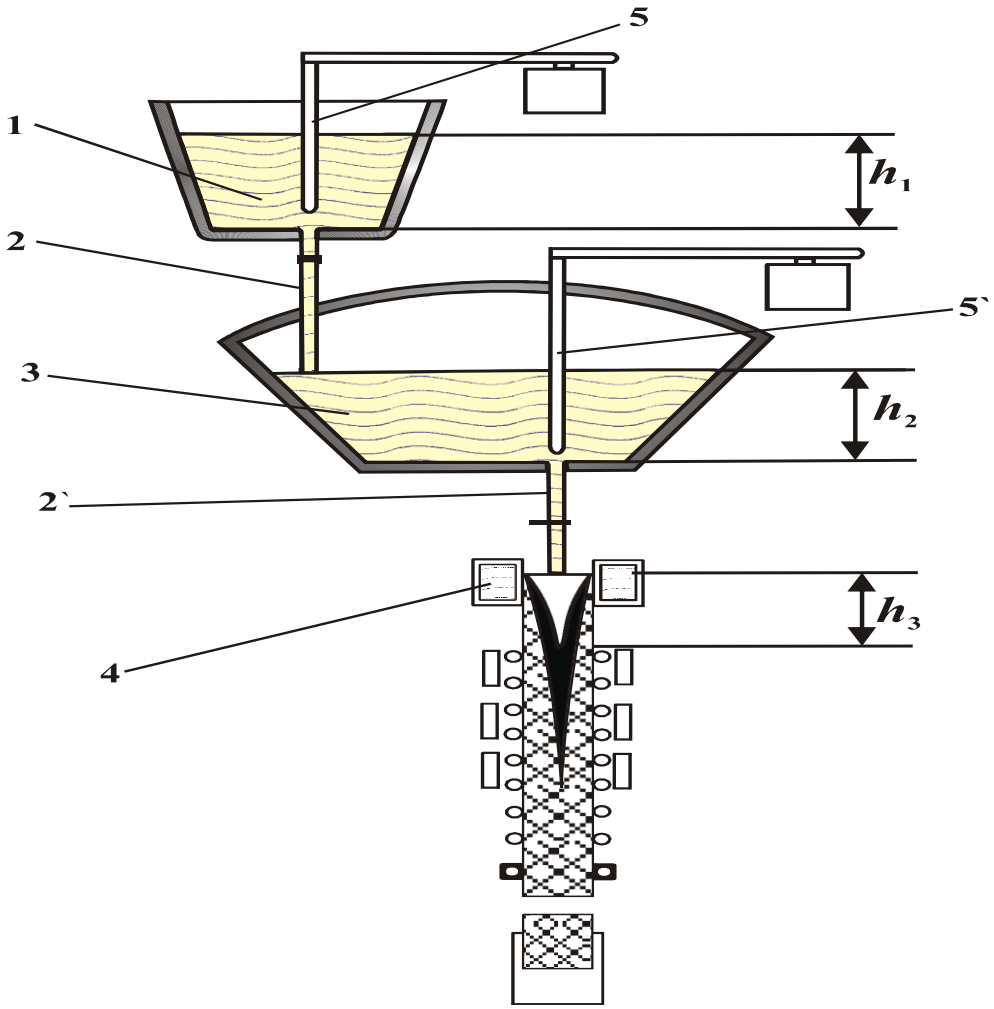

Рис. 1. Схема вертикальной МНЛЗ

Как показывают авторы [1], выделение входных и выходных параметров модели системы, эта декомпозиция модели на два блока:

«сталеразливочный ковш–промежуточная ёмкость МНЛЗ» S_1, ***«промежуточная ёмкость–кристаллизатор–тянущие клети МНЛЗ»*** S_2, связи между этими блоками показаны на рис. 2. Здесь же указаны условные обозначения параметров.

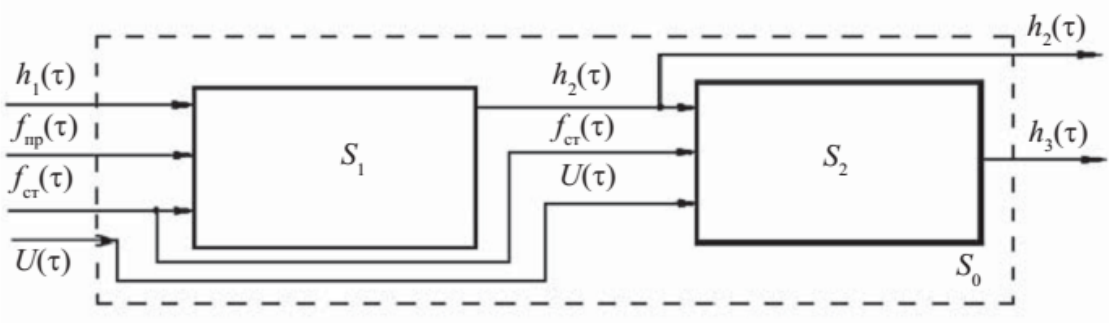

Рис. 2. Декомпозиция модели уровня расплава в МНЛЗ

Для подробного изучения принцип работы МНЛЗ, рассмотрим синтез модели каждого из блоков в отдельности.

§1.1. Динамические свойства подсистемы *МНЛЗ «сталеразливочный ковш–промежуточная ёмкость»*

Задачей управления объектом «*сталеразливочный ковш– промежуточная ёмкость МНЛЗ*» является жёсткая стабилизация уровня металла в промежуточной ёмкости с целью обеспечения стабильных условий всплывания неметаллических включений и выделения газов, а также стабильности статического напора, определяющего условия истечения струи металла из дозатора или стопорного устройства в кристаллизатор.

Ниже приводим вещественный вариант решаемой задачи, т.к. в дальнейшем для описания этой задачи как логико-динамические системы (ЛДС) в интервальном варианте эти данные используются. Дальнейшее изложения рассматривается согласно работам авторов [1].

Динамические свойства подсистемы применительно к сталеразливочным ковшам стопорного типа характеризуются следующим уравнением материального баланса:

$$\rho S_2 dh_2(\tau) = \left(G_{пр}(\tau) - G_{ст}(\tau)\right) d\tau, \qquad (1)$$

где h_2–текущее значение уровня металла в промежуточной ёмкости; ρ– плотность металла; S_2-площадь зеркала металла в промежуточной ёмкости; $G_{пр}$–приток металла из сталеразливочного ковша; $G_{ст}$–сток металла из промежуточной ёмкости. Здесь

$$G_{пр} = \alpha_{пр} f_{пр} \rho \sqrt{h_1}; \qquad (2)$$

$$G_{ст} = \alpha_{ст} f_{ст} \rho \sqrt{h}; \qquad (3)$$

где $\alpha_{ст}$, $\alpha_{пр}$– приведённые коэффициенты расхода на стоке и притоке; $f_{ст}$, $f_{пр}$– проходные сечения в стопорных парах промежуточной ёмкости и сталеразливочного ковша; h_1– уровень металла в сталеразливочном ковше. Тогда уравнение (1.1) примет вид

$$S_2 \dot{h}_2(\tau) + \alpha_{ст} f_{ст} \rho \sqrt{h_2(\tau)} = \alpha_{пр} f_{пр} \rho \sqrt{h_1} \qquad (4)$$

Следовательно, динамика изменения уровня металла в промежуточной ёмкости МНЛЗ характеризуется нелинейным дифференциальным уравнением первого порядка.

Используя метод линеаризации, линеаризуем уравнение (4) в окрестностях точек $h_2=h_{20}$, $h_1=h_{10}$, $f_{ст}(\tau)=f_{ст}(\tau)_0$, $f_{пр}(\tau)=f_{пр}(\tau)_0$, номинальные (средние) значения уровня расплава в промежуточной ёмкости, сталеразливочном ковше, проходные сечения в стопорных парах промежуточной ёмкости и сталеразливочного ковша [1].

Опуская промежуточные выкладки получим:

$$S_2 \Delta\dot{h}_2(\tau) + \frac{\alpha_{ст} f_{ст_0}}{2\sqrt{h_{2_0}}} \Delta h_2(\tau) = б_{пр} f_{пр} \rho \sqrt{h_{1_0}} + \frac{\alpha_{пр} f_{пр_0}}{2\sqrt{h_{1_0}(\tau)}} \Delta h_1(\tau) - \alpha_{ст} \Delta f_{ст}(\tau) \sqrt{h_{2_0}}, \qquad (5)$$

где $\Delta h_2(\tau)$, $\Delta f_{пр}(\tau)$, $\Delta f_{пр}(\tau)$, $\Delta h_1(\tau)$ – приращения соответствующих параметров от их номинальных (равновесных) значений [1].

Осуществив перегруппировку членов уравнения, получим линейное дифференциальное уравнение в отклонениях, которое характеризует динамику изменения уровня в промежуточной ёмкости при различных возмущениях [1]:

$$T_1 \Delta\dot{h}_2(\tau) + \Delta h_2(\tau) = k_1 f_{пр}(\tau) + k_2 \Delta f_{ст}(\tau) + k_3 \Delta h_1(\tau), \qquad (6)$$

где

$$T_1 = \frac{2F_2\sqrt{h_{2_0}}}{\alpha_{ст} f_{ст_0}}; k_1 = \frac{2\alpha_{пр}\sqrt{h_{1_0} h_{2_0}}}{\alpha_{ст} f_{ст_0}}; k_2 = -\frac{2h_{2_0}}{f_{ст_0}};$$

$$k_2 = \frac{2h_{2_0}}{f_{ст_0}};\ k_3 = \frac{\alpha_{пр} f_{пр_0}}{\alpha_{ст} f_{ст_0}} \sqrt{\frac{h_{2_0}}{h_{1_0}}}. \qquad (7)$$

Имея в виду, что

$$f_{ст_0} = \frac{SV}{\alpha_{ст}\sqrt{h_{2_0}}};\quad f_{пр_0} = \frac{SV}{\alpha_{пр}\sqrt{h_{1_0}}}, \qquad (8)$$

где S–площадь сечения заготовки; V–скорость вытягивания слитка, можно представить коэффициенты выражений (7) в другом виде:

$$T_1 = \frac{2F_2 h_{2_0}}{SV}; k_1 = \frac{2\alpha_{пр}\sqrt{h_{1_0}}}{SV};$$

$$k_2 = -\frac{2\alpha_{ст} h_{2_0}\sqrt{h_{2_0}}}{f_{ст_0}}; k_3 = \frac{h_{2_0}}{h_{1_0}}. \qquad (9)$$

Правая часть уравнения (6) показывает, что возмущения в объекте проходят по каналу регулирующего воздействия $\Delta f_{пр}(\tau)$ и каналам нерегулируемых входных параметров(возмущений) $\Delta h_1(\tau)$, $\Delta f_{ст}(\tau)$.

Так как модель этой подсистемы описывается линейным уравнением, то для неё справедлив принцип суперпозиции. Считая, что каналы входных параметров автономны, разбиваем его на три уравнения. Левые части этих уравнений одинаковы, а правые отличаются характерами входных воздействий:

$$\begin{cases} T_1 \Delta\dot{h}_{2,1}(\tau) + \Delta h_{2,1}(\tau) = k_1 f_{пр}(\tau) \\ T_1 \Delta\dot{h}_{2,2}(\tau) + \Delta h_{2,2}(\tau) = k_2 \Delta f_{ст}(\tau) \\ T_1 \Delta\dot{h}_{2,3}(\tau) + \Delta h_{2,3}(\tau) = k_3 \Delta h_1(\tau), \end{cases} \qquad (10)$$

$$\Delta h_2(\tau) = \Delta h_{2,1}(\tau) + \Delta h_{2,2}(\tau) + \Delta h_{2,3}(\tau), \qquad (11)$$

с начальными условиями:

$$\Delta h_{2,1}(0) = 0;\ \Delta h_{2,2}(0) = 0;\ \Delta h_{2,3}(0) = 0. \qquad (12)$$

Решение уравнения (10), например, при однократном ступенчатом возмущении $\Delta f_{пр}$ описывается в виде [1]:

$$\Delta h_{2,1}(\tau) = k_1 f_{пр}(\tau)(1 - e^{-\tau/T}). \qquad (13)$$

По другим каналам это выражение отличается лишь постоянным множителем в правой части уравнения (13). Аналогично определяется и новое установившееся значение уровня металла в промежуточной ёмкости по другим каналам входных воздействий.

Замечание: в дальнейшем будем использовать только линеаризованные уравнения, записанные относительно отклонений от установившихся значений переменных, однако для сокращения записи знак «Δ» будем опускать.

§1.2. Динамические свойства подсистемы *МНЛЗ «промежуточная ёмкость–кристаллизатор–тянущие клети»*

Задача управления процессом стабилизации уровня металла в кристаллизаторе h_3 является важнейшей задачей технологии непрерывной разливки стали. Управление уровнем металла в кристаллизаторе должно обеспечить стабилизацию высоты заполнения кристаллизатора жидким металлом в ходе разливки и, таким образом, при прочих равных условиях обеспечить неизменную толщину стенок слитка при выходе его из кристаллизатора. Управление должно и исключить случаи перелива жидкого металла через кристаллизатор и недопустимого снижения уровня, которые могут привести к ослаблению стенок слитка и прорыву жидкого металла [1].

Возможны два метода стабилизации уровня металла в кристаллизаторе: с помощью изменения притока жидкого металла из промежуточной ёмкости в кристаллизатор при постоянной скорости вытягивания слитка и изменение скорости вытягивания слитка из кристаллизатора при бесстопорном истечении металла из промежуточной ёмкости.

Динамические свойства этого объекта характеризуются следующим уравнением материального баланса [1]:

$$\rho S d h_3(\tau) = (G_{ст}(\tau) - \rho SV(\tau))d\tau \qquad (14)$$

где S–площадь сечения отливаемой заготовки; V–скорость вытягивания слитка; ρ–плотность металла; $h_3(\tau)$-текущее значения уровня металла в кристаллизаторе.

Принимая уровень металла в промежуточной ёмкости постоянным в стационарном режиме литья, преобразуем уравнение (14) к виду

$$\dot{h}_3(\tau) = \frac{\alpha_{ст}\sqrt{h_{2_0}}}{S} f_{ст}(\tau) - V(\tau). \qquad (15)$$

На основании известных характеристик электрооборудования МНЛЗ можно считать [2], что связь между скоростью вытягивания клети V непрерывного слитка и управляющим воздействующим на привод $\Delta U(\tau)$ описывается дифференциальным уравнением первого порядка с постоянными коэффициентами:

$$T\dot{V}(\tau) + V(\tau) = k_5 U(\tau), \qquad (16)$$

где T– постоянная времени электропривода; k_5–коэффициент передачи по каналу управления скоростью вытягивания слитка.

Отсюда следует, что математическое описание подсистемы ***«промежуточная ёмкость–кристаллизатор–тянущие клети»*** сводится к системе двух обыкновенных дифференциальных уравнений первого порядка, которые в стационарном состоянии (h_3=h_{30}=const; V=V_0=*const*) запишутся в виде [1]:

$$\begin{cases} \dot{h}_3(\tau) = k_4 f_{ст}(\tau) - V(\tau) \\ T\dot{V}(\tau) + V(\tau) = k_5 U(\tau), \end{cases} \qquad (17)$$

с начальными условиями:

$$h_3(0) = 0; V(0) = 0, \qquad (18)$$

где $k_4 = \frac{\alpha_{ст}\sqrt{h_{2_0}}}{S}$-коэффициент передачи по каналу изменения площади проходного сечения в промежуточной ёмкости.

Нужно заметить, что при стопорном дозировании металла в рассматриваемой подсистеме управляющим воздействием является площадь проходного сечения $\Delta f_{ст}(\tau)$, а скорость вытягивания слитка следует считать внешним

воздействием. При дозированной разливке управление производится изменением управляющего в тянущих клетей воздействия $\Delta U(\tau)$ на привод тянущих клетей по каналу изменения скорости вытягивания слитка, а основные внешние воздействия проходят по каналу изменения площади проходного сечения дозаторного стакана $\Delta f_{ст}(\tau)$.

В вещественном варианте, т.е. при условии детерминированности величин, уравнения (6) и (15) как логико-дифференциальные уравнения (ЛДУ), записывается в следующем виде:

$$\dot{h}_2(\tau) = \frac{1}{T_1}\left[k_1 \sum_i L_i^{f_п} f_{пр}(\tau) + k_2 \sum_j L_j^{f_c} f_{ст}(\tau) + k_3 h_1(\tau) - h_2(\tau)\right], \quad i=1,2;\ j=1,2; \tag{19}$$

$$\dot{h}_3(\tau) = k_4 L_m^{f_c} f_{ст}(\tau) - V(\tau), \tag{20}$$

с начальными условиями

$$h_1(0) = h_{10},\ h_2(0) = h_{20},\ h_3(0) = h_{30},$$
$$V(0) = V_0\ f_{ст}(0) = f_{ст0},\ f_{пр}(0) = f_{пр0}. \tag{21}$$

В уравнениях (19) и (20) логические переменные подчиняются условиям единственности [5]:

$$L_i^{f_п} \cap L_j^{f_c} = 0,\ L_m^{f_c} \cap L_j^{f_c} = 0,\ L_i^{f_п} \cap L_m^{f_c} = 0,\quad i \neq j,\ m \neq j,\ i \neq m, \tag{22}$$

и полноты

$$\cup_i L_i^{f_п} = 1,\ \cup_j L_j^{f_c} = 1,\ \cup_m L_m^{f_c} = 1,\quad i=1,2;\ j=1,2;\ m=1,2. \tag{23}$$

Решение уравнения (19) с учетом начальных условий и использованием логического предиката, при однократном ступенчатом возмущении $f_{пр}$ описывается в виде [1]:

$$h_{2,1}(\tau) = k_1 f_{пр}(\tau)\left(1 - e^{-\tau/T}\right),\ i = 1,2. \tag{24}$$

Аналогично определяется и новое установившееся значение уровня металла в промежуточной ёмкости по другим каналам входных воздействий.

Теперь уравнения (19) и (20) запишем, как логико-динамическую систему (ЛДС) [5, 7]:

$$\begin{cases} \dot{h}_2(\tau) = \frac{1}{T_1}\left[k_1 L_i^{f_п} f_{пр}(\tau) + k_2 L_j^{f_c} f_{ст}(\tau) + k_3 \Delta h_1(\tau) - h_2(\tau)\right], \\ \dot{h}_3(\tau) = k_4 L_m^{f_c} f_{ст}(\tau) - V(\tau), \\ L_i^{f_п} = \begin{cases} 1, & \text{если } i = 1 \\ 0, & \text{если } i = 2, \end{cases} \\ L_j^{f_c} = \begin{cases} 0, & \text{если } j = 1 \\ 1, & \text{если } j = 2, \end{cases} \\ L_m^{f_c} = \begin{cases} 1, & \text{если } m = 1 \\ 0, & \text{если } m = 2. \end{cases} \end{cases} \tag{25}$$

с начальными и логическими условиями (22)-(323).

Настоящее время для поиска путей кардинального энергетического совершенствования современных и перспективных технологических процессов, в том числе и с учётом экологических факторов, требуется перейти на новые идейные и концептуальные основы. Наступило время рассмотрения технических и природных систем в неразрывной динамической взаимосвязи, когда протекающие в них технологические и экологические процессы оказывают непосредственное динамическое влияние друг на друга.

§1.3. Интервальный вариант динамического свойства подсистемы *МНЛЗ «промежуточная ёмкость–кристаллизатор–тянущие клети»*

При реализации описываемого метода, а именно, при определении реального решения уравнения вида (19-20) и систему уравнений (25), на ЭВМ возникают также и ошибки округлений, влияние которых в совокупности с другими источниками погрешности может оказаться существенным для определения структурных и локальных состояний. Для единовременного учета всевозможных источников погрешностей при разрешении моделей типа ЛДС, а также из сущности постановки задачи следует, т.е. выбора управления обеспечивающего постоянства уровней расплава в промежуточной ёмкости h_2 и металла в кристаллизаторе h_3, что величины h_2, h_3 и скорость вытягивания клети V, могут принимать значения из некоторого промежутка заданном технологическим регламентом. В этой связи, эти величины могут рассмотрены как интервальные переменные и предлагается использовать методы интервального анализа.

Учитывая вышесказанное, изложим интервальный вариант изучаемых задач.

Замечание: для получения интервальных обобщенных и/или естественных расширений той или иной вещественных функций используем определения приведенных в [3, 4].

Отметим, что через $\boldsymbol{\tau} = [\underline{\tau}, \overline{\tau}]$ обозначен интервал, где $\underline{\tau}$ и $\overline{\tau}$ означают нижную и верхную границу интервала $\boldsymbol{\tau}$, а $\boldsymbol{H}(\boldsymbol{\tau})$, $\boldsymbol{f}(\boldsymbol{\tau})$, $\boldsymbol{V}(\boldsymbol{\tau})$ интервальнозначные функции, h шаг интегрирования.

В интервальном варианте, т.е. при условии недетерминированности величин, уравнения (19) и (20) как логико-дифференциальное уравнение (ЛДУ), записывается в следующем виде:

$$\dot{\boldsymbol{H}}_2(\boldsymbol{\tau}) = \frac{1}{T_1}\left[k_1 \sum_i L_i^{f_п} \boldsymbol{f}_{пр}(\boldsymbol{\tau}) + k_2 \sum_j L_j^{f_c} \boldsymbol{f}_{ст}(\boldsymbol{\tau}) + k_3 \boldsymbol{H}_1(\boldsymbol{\tau}) - \boldsymbol{H}_2(\boldsymbol{\tau})\right], \quad i=1,2;\ j=1,2; \tag{26}$$

$$\dot{\boldsymbol{H}}_3(\boldsymbol{\tau}) = k_4 L_m^{f_c} f_{ст}(\tau) - \boldsymbol{V}(\boldsymbol{\tau}), \tag{27}$$

с начальными условиями

$$h_{10} \in \boldsymbol{H}_{10},\ h_{20} \in \boldsymbol{H}_{20},\ h_{30} \in \boldsymbol{H}_{30},\ V_0 \in \boldsymbol{V}_0,\ f_{ст0} \in \boldsymbol{f}_{ст0},\ f_{пр0} \in \boldsymbol{f}_{пр0}, \tag{28}$$

здесь $\tau \in \boldsymbol{\tau} = [\underline{\tau}, \overline{\tau}]$.

Для решения интервальной задачи Коши

$$\dot{\boldsymbol{H}}_3(\boldsymbol{\tau}) = k_4 \boldsymbol{f}_{ст}(\tau) - \boldsymbol{V}(\boldsymbol{\tau}), \tag{29}$$

$$h_3(\tau_0) \in \boldsymbol{H}_0, \qquad (30)$$

где $\boldsymbol{H}_0$– некий замкнутый интервал, содержащий неточно заданное начальное значение, можно применить метод s–го порядка из [4], который является интервальным аналогом явного метода Рунге-Кутта. Однако, при решении систем уравнений, как известно [4] явные методы Рунге-Кутта, подвержены “эффекту раскрутки” и обычно при большом числе переменных исключаются из рассмотрения, поскольку с увеличением порядка метода, быстро растут вычислительные затраты, а область устойчивости является ограниченной. В нашем случае, число аргументов моделирующей функции равна двум:

-постоянство уровня расплава в промежуточной ёмкости h_2. Это позволяет стабилизировать условия всплывания неметаллических включений, выделения газов, а также стабильность гидростатического напора, определяющего условия истечения струи металла в кристаллизатор;

-постоянство уровня металла в кристаллизаторе h_3, что обеспечивает стабильность высоты заполнения кристаллизатора жидким металлом и таким образом при прочих равных условиях обеспечит неименную толщину стенок слитка при выходе из кристаллизатора. Управление должно исключить случаи прорыва жидкого металла через кристаллизатор и перелив жидкого металла через горловину кристаллизатора.

Пусть при любом $\boldsymbol{H}(\tau_0)$ из $\boldsymbol{H}_0$ задача (26)–(27) имеет единственное решение [4]. Тогда для определения на $\Delta_\tau = [\tau_0, c]$ интервалов $\boldsymbol{H}(\tau_j) = \boldsymbol{H}_j$ таких, что

$$\boldsymbol{H}(\tau_j) \in H, \tau_j = \tau_0 + jh \in \boldsymbol{\tau}, h = \frac{(c-\tau_0)}{n}, \quad (j = \overline{1,n}), \qquad (31)$$

можно использовать полуявные формулы Рунге-Кутта [3,4].

Заметим, что вещественные и интервальные методы решения задачи Коши, минимизирующие невязку путём аппроксимации её значения многочленами, относятся к классу конечно-разностных методов. Имеет место следующая:

Т е о р е м а . *Для интервалов* $\boldsymbol{H}_j$, *вычисленных по одному из интервальных аналогов конечно-разностных методов, справедливы включения*

$$\boldsymbol{H}(\tau_j) \in \boldsymbol{H}_j, \tau_j = \tau_0 + jh \in \boldsymbol{\tau}, h = \frac{(c-\tau_0)}{n}, \quad (j = \overline{1,n}) \qquad (33)$$

и оценка ширины интервального решения

$$\omega(\boldsymbol{H}_j) \le a\omega(\boldsymbol{H}_0) + bh^s, \qquad (34)$$

где константы a *и* b *не зависят от шага интегрирования* h, а $h(\tau_0)$ *принадлежит интервалу* $\boldsymbol{H}_0$ *из* $\Delta_\tau = [\tau_0, c]$.

Доказательство.

Доказательство включений (33) проводится аналогично доказательству соответствующей теоремы включения для случая явного интервального метода Рунге–Кутта из [4] с использованием основной теоремы интервальной арифметики [3]. Оно здесь опускается из соображений краткости.

Вывод

В этой статье построена и исследована интервальная модель процесса машин непрерывного литья заготовок. Приведен метод решения этой задачи и получена оценка ширины интервального решения. Так как по реальному объекту на практике расчеты проводятся с учетом всех источников погрешностей в рамках интервальной арифметики, то полученные по данной модели результаты будут давать гарантированные двусторонние приближения на прогнозируемые показатели процесса литья заготовки.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2021 **Issue:** 11 **Volume:** 103
Published: 04.11.2021 **http://T-Science.org**

QR – Issue QR – Article

Shovkat Kabuldjanovich Djamalov
Tashkent branch of Plekhanov Russian University of Economics
Vice-rector

TRADE AND ECONOMIC COOPERATION OF CHINA WITH UZBEKISTAN

Abstract: *China's place is determined by its economic strength in the modern global economy. In terms of GDP (at the exchange rate), China is behind the United States, occupying the 2ndplace. It is China that largely determines the growth of the world economy. Thanks to the competent management policy, China was able to realize its competitive advantages, including the huge potential of the domestic market, and occupied a place in the world economy as a leading manufacturer of industrial products. The states which are in debt to China: Pakistan - $ 20.2 billion; Angola - $ 15 billion; Kenya - $ 7.5 billion, Efipia $ 6.5 billion; Ecuador - $ 5.8 billion; Shli-Lanka-5 $, 4 billion; Laos-5.2 billion; Brazil - $ 5.0 billion; Belarus - $ 5.0 billion; Egypt $ 4.1 billion, the other 85 countries owe China (each) an average of $ 0.8 billion [1].*

China is a leading foreign trade partner of Uzbekistan, having replaced Russia in this status several years ago. The article examines the issues of trade and investment cooperation between Uzbekistan and China.

Key words: *Chinese economy, trade cooperation, investment cooperation, electrical clusters, export production of the PRC.*

Language: *English*

Citation: Djamalov, Sh. K. (2021). Trade and economic cooperation of China with Uzbekistan. *ISJ Theoretical & Applied Science, 11 (103),* 170-174.

Soi: http://s-o-i.org/1.1/TAS-11-103-8 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2021.11.103.8

Scopus ASCC: *2000.*

Introduction

The unique achievements of the PRC during the last forty years of reforms have focused the attention of researchers on the phenomenon of the Chinese economy. China is gradually becoming not only the world's largest producer of goods, the most important exporter and importer of capital, but also a source of global economic growth. The implementation of the Belt and Road Initiative is an important step by the Chinese government in promoting a new model of globalization and is one of the most important priorities of its work. The Belt and Road Initiative is a project for the economic integration of China with Asia, Europe and Africa. The countries included in this project have a population of 4.4 billion people, or 62.55% of the world's population, and account for almost 30% of world GDP [2]. The initiative is seen as a tool to promote national economic development by boosting exports, expanding access to natural resources and supporting important domestic industries. The implementation of this initiative will provide an opportunity to develop the vast western regions of China, which can help to overcome the imbalance in socio-economic development between the eastern, western and central provinces. One Belt, One Road covers broad areas of economic cooperation. Among them, there are three priority areas: infrastructure, industrial and financial cooperation. Given the low level of infrastructure development in most countries along the Silk Road, the implementation of this initiative will be an essential prerequisite for regional economic integration and development. Infrastructure development within the belt includes the construction of rail and road networks, port facilities, pipelines, airports, energy and communications infrastructure. Industrial collaboration is the second key area. Massive investments in infrastructure projects in the countries participating in the initiative will increase the demand for building materials and equipment for transport, energy and telecommunications. In some of these areas, the PRC has a comparative advantage.

This will help absorb excess capacity in China and smooth the economy's transition to a new growth model. Financial cooperation is the third important area of the project. In addition to the establishment of the Silk Road Fund and the Asian Investment Bank, China is seeking to expand bilateral settlements, create a system of currency stability within the belt, which will help strengthen the yuan's status as a global currency. China maintains trade and economic ties with 182 countries. Moreover, the main trading partners of the PRC are fast-growing Asian countries, and developed countries account for just over 30% of foreign trade turnover. Today, the export commodity nomenclature includes about 50 thousand items of goods, among which highly processed goods account for a large share. Electronics, telecommunications and sound equipment account for over 25%. Among them, machines, equipment and tools account for 49.3%, household goods - 12.8%. The main imports are also finished goods, with raw materials accounting for 25.7%. China occupies a leading position in the world in the production of labor-intensive products and articles necessary for new construction and the implementation of large infrastructure facilities. Thus, it accounts for 60% of world cement production, 50% of steel, 55% of primary aluminum, 44% of refined lead, 43% of zinc, 27% of cars (2015).

China is a leading supplier of products to many countries in the world, both developed and developing. China accounts for 21.5% of US imports, 24.8 - Japan, 20.7 - R. Korea, 17.9 - Brazil, 22.1% of Angola's imports (2015). The economies of such countries as the DPRK (75.8% of exports and 76.4% of imports, 2015), Mongolia (84% of exports and 40% of imports, 2015) are even more tied to China [1-3]. The rapid economic development of China in the post-pandemic period will create more and more opportunities for its neighbors, including Uzbekistan. Today, for Uzbekistan, it is not only a leading trade and economic partner, which has proven its reliability, especially in the context of the coronavirus crisis, but also the main point for growth. Further development vectors include an increase in trade through the world's largest domestic market, as well as significant financial resources of the PRC, which can be directed to the implementation of joint investment projects. In addition, many Chinese companies are implementing projects funded by international financial institutions. Among them are the modernization of pumping stations, the construction of power plants, the reconstruction of canals and highways, and the electrification of railways. In November 2020, 17 enterprises of Uzbekistan participated in the third China International Import EXPO in Shanghai, and the area of the republic's stands was more than 300 square meters, which is twice as much as in 2019. In Uzbekistan's trade with China, then China has retained its position as the largest importer and exporter of goods. China also ranked first in imports of Uzbek natural gas, second in textile products, and fifth in agricultural products. For China, 2021 is the first year of the implementation of the 14th five-year plan. In September 2021, Beijing set a goal - economic growth per year by at least six percent. The PRC will deepen reforms in key areas with an emphasis on innovation, stimulate high-quality development of the real sector of the economy, expand domestic demand, implement a strategy for the development of rural areas, achieve a high level of external openness, promote the quality of foreign trade and the use of foreign capital while maintaining their stability. , adhere to the concept of development "everything for the people", improve the well-being of the population in the spheres of education, health care and housing. In total, China imported more than $ 70 million worth of agricultural products in 2020, up 44.5 percent from 2019. Only the volume of exports of Uzbek mung bean to China has actually tripled. At the same time, the share of Uzbekistan in the total volume of imports of these products to China increased from 26 percent to 36.5 percent. Thus, Uzbekistan has become the largest supplier of mung bean to China. For China, 2021 is the first year of the implementation of the 14th five-year plan. At the recent "two sessions" held in Beijing, a goal was set - economic growth per year by at least six percent. The PRC will deepen reforms in key areas with an emphasis on innovation, stimulate high-quality development of the real sector of the economy, expand domestic demand, implement a strategy for the development of rural areas, achieve a high level of external openness, and promote the quality of foreign trade and the use of foreign capital while maintaining their stability, adhere to the concept of development "everything for the people", improve the well-being of the population in the spheres of education, health care and housing. The close interdependence of the Chinese economy and the economies of the leading centers of the world economy is due not only to the volume of their foreign trade and investment cooperation, but also to the wide presence of the world's leading TNCs in the PRC, about 45% of all export products are produced at enterprises with the participation of foreign capital. The expansion of the geography of Chinese foreign trade, the transition to global world coverage is facilitated by the improvement of the structure of Chinese exports. According to the WB Doing Business 2020 rating, China took 31st place and entered the top 40 countries for the first time, improving its position by 15 points compared to last year's rating (in 2019 it was ranked 41st). According to WB experts, China has made significant progress in improving the business environment for small and medium-sized enterprises in a number of indicators and remains an attractive economy for foreign investment. The United Nations Conference on Trade and Development (UNCTAD) Global Investment Trends Report 2019 notes that global foreign direct investment (FDI) continues to

decline for the third consecutive year, reaching $ 1.39 trillion in 2019. dollars, which is 1% less than in 2018 and 13% less than in 2017. At the same time, the volume of FDI in China, on the contrary, is growing and in 2019 amounted to $ 140 billion (in 2018 - $ 139 billion) [4]. In terms of FDI, China remains second in the world after the United States ($ 251 billion). The bulk of FDI in China comes from Hong Kong (70%), as well as Singapore, Taiwan, Great Britain, Japan, the United States and Germany (3-4% each) [5]. One of the examples of Chinese zones of trade and economic cooperation in other countries is the Peng Sheng Industrial Park in Uzbekistan, which was created in 2014 in the Syrdarya region on an area of 102 hectares through investments of the Chinese company Wenzhou Jinsheng Tradingin the amount of about $ 90 million.

In Uzbekistan, the park was given the status of the Syrdarya branch of the special industrial zone "Jizzakh", and in China the park was approved as a Chinese state overseas zone of trade and economic cooperation. There are 9 large electro technical clusters in China, each of which in terms of production volume is larger than the total electro technical production of the developed countries of the world. Clusters can be roughly divided into three categories [6]. One of them is state electrical engineering companies operating on state markets, high-voltage networks, industrial enterprises according to the "cost + margin" formula. These are high-tech industries that do not feel the need to save on materials.

Another type of cluster includes large private companies that are included in the top 500 enterprises of the Chinese economy and are listed on the stock exchange [7]. They supply products mainly for the highly competitive domestic construction market and operate primarily in the economic segment, but also export. Companies in this cluster are growing primarily due to the developed Chinese distribution system. These enterprises also work for the industrial market, although they are less focused on it than on the construction market.

The third category is companies that produce both technological and standard solutions for developing countries. The stable demand for their products correlates with the positive dynamics of developing economies, which in the past 20 years have been growing faster than the economies of developed countries. Export production of the PRC can move to the internal regions of the country. For example, the Taiwanese company Foxconn, which employs over 1 million people in China, is moving its production from the coastal Shenzhen to prov. Henan, Sichuan. Uzbekistan's foreign trade turnover with China in 2019 amounted to $ 7.62 billion, (an increase of 18.5% compared to 2018), of which exports - $ 2.52 billion (a 13% decrease), imports - $ 5.1 billion (an increase of 41%). In terms of the volume of trade between Uzbekistan and foreign countries, China took first place with a specific value of 18.1% (second - Russia (15.7%), third - Kazakhstan (8.0%)). At the same time, the negative balance of foreign trade turnover with China amounted to $ 2.58 million and, compared to 2018, increased more than three times, due to the growth of imports of machinery and equipment as part of investment programs for the construction and modernization of production facilities of industrial enterprises [8].

In Uzbekistan, at the beginning of 2020, there are 1,652 enterprises (16% of the total) with Chinese investments, of which 531 enterprises were created in 2019. Moreover, more than 120 enterprises with 100% Chinese capital. Representative offices of more than 70 Chinese companies have also been accredited. In terms of the number of enterprises established in Uzbekistan, China ranks second after Russia (1828 enterprises) [9]. The main areas of activity of enterprises with Chinese capital are: oil and gas, chemical, pharmaceutical, textile industry, transport, construction and telecommunications. Enterprises with Chinese capital have been established in all regions of the republic. At the same time, the largest number of them was created in Tashkent (775), Tashkent region (306) and Samarkand (88), and they occupy the largest share of the total number of foreign enterprises in the region in Jizzakh (35.6%), Syrdarya (30.5%) and Tashkent (27.3%) regions [10]. A new cement plant was launched in the Fergana region, created with the participation of a large Chinese company Shanxi Xiang sheng, which invested $ 113 million for the implementation of the first phase of the project. Thanks to the advanced technologies used in production, this plant is capable of producing 2.5 thousand tons of high-quality cement per day. In 2020, the project was completed, and the plant reached full capacity by the end of the year, which made it possible to employ more than a thousand people.

Similar plants will be opened in five regions of Uzbekistan, which will be able to produce about 6 million tons of high-quality cement per year, which will contribute to the development of the construction sector and create additional jobs.

In September 2019, as part of a strategic investment partnership project for the development of agriculture in Uzbekistan, the Samarkand regional khokimiyat, the American company GMFR Global Group and the Chinese holding Beijing Huiyuan Holding signed a trilateral agreement to create the production of packaged water, juices and dairy products. The new plant will annually produce 20 million tons of products, which will be exported. At the same time, equipment worth about $ 100 million will be imported for the production of natural juice. In 2017, the Chinese corporation Jinsheng Group invested more than $ 100 million to implement a project to create a high-tech textile complex in the Kashkadarya region with a total production capacity of 15.0 thousand tons of blended yarn and 10 million

tones of fabric. The Jinsheng Group Corporation includes 77 companies and enterprises located in Germany, Switzerland, China and other countries, with a total annual turnover of more than $ 3 billion, which specialize in the production of textiles, mechanical engineering and other industries. In 2021, our countries will continue to deepen partnerships in such traditional areas as the oil and gas sector, energy, agriculture and water management, textiles, building materials, the organization of industrial parks, as well as actively cooperate in new areas, including healthcare, water-saving technologies, renewable energy sources. , minerals, digital economy and e-commerce. This will provide an opportunity to advance practical bilateral trade and economic cooperation to a higher quality level and will bring more benefits to the peoples of the two countries. China is the main source of foreign investment for Uzbekistan. Investments from the Middle Kingdom play an active role in promoting the development of the republic's economy, increasing employment and improving the well-being of the population. In recent years, dozens of major projects have been completed with the help of Chinese investments. These are three branches of the China - Uzbekistan gas pipeline, the Pengsheng industrial park, the LT Textile International textile factory in Karshi, the Andijan textile industrial zone, the Ming Yuan Silu glass factory in Jizzak, as well as new cement plants. Thanks to the financing of the Chinese side, our countries have successfully implemented projects for the construction of the Kungrad soda plant, the Dekhkanabad potash fertilizer plant, the railway tunnel on the Kamchik pass, the supply of equipment for pumping stations and many other major production and infrastructure initiatives. Currently, projects are being implemented to modernize the Shargunkumir enterprise and build small hydroelectric power plants. In addition, a special working group on investment cooperation was established under the Subcommittee on Trade and Economic Cooperation of the Uzbek-Chinese Intergovernmental Committee on Cooperation. This mechanism will actively study the prospect of partnership in this direction, collect and resolve issues that Chinese companies have in the course of the implementation of investment projects, jointly create a favorable business environment in order to further promote and implement new initiatives. In recent years, a large number of Chinese investors have appeared on the local market, and the number of enterprises with Chinese capital is constantly increasing. The spheres in which they have implemented major projects include the textile industry, the building materials industry, mechanical engineering and many others.

A large number of medium and small enterprises are engaged in business in the tourism and trade areas. In general, the successful activities of Chinese investors clearly reflect the investment attractiveness of Uzbekistan.

Currently, the Association of Chinese Entrepreneurs in Uzbekistan, together with the Chinese Embassy in Uzbekistan and the Uzbek Embassy in China, are actively promoting the establishment of partnerships between enterprises of our countries. The Association holds various seminars, forums, presentations and other events in China to familiarize potential investors with Uzbekistan.

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Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
	GIF (Australia) = 0.564	ESJI (KZ) = 9.035	IBI (India) = 4.260
	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2021 **Issue:** 11 **Volume:** 103
Published: 05.11.2021 **http://T-Science.org**

QR – Issue QR – Article

Muqaddam Jumanazarovna Abduvaliyeva
Termez branch of the Tashkent State Technical University named after I. Karimov
Lecturer
732000, Republic of Uzbekistan, Termez, st. I. Karimov, 288a
muqaddamabduvaliyeva@gmail.com

Sherzod Abduzairovich Kasimov
Termez State University
Associate professor of the department,
190111, Republic of Uzbekistan, Termez, Barkamol Avlod str., 43.
sh_kasimov@rambler.ru

Khayit Khudainazarovich Turaev
Termez State University
Doctor of Chemistry, Professor,
190111, Republic of Uzbekistan, Termez, st. Barkamol Avlod, 43.
hhturaev@rambler.ru

Elyor Mamasoat Ugli Abdunazarov
Termez branch of the Tashkent State Technical University
student

SYNTHESIS AND PROPERTIES OF A COMPLEX FORMING SORBENT BASED ON CARBAMIDE FORMALDEHYDE AND PHENOLSULPHTHALEIC ACID

Abstract: *The article examines the study of a complexing ion exchanger based on urea, formaldehyde and phenolsulfophthaleic acid. The effect of temperature and molar ratios of the starting materials on the properties of the resulting complex ion exchanger has been determined. The structure of the synthesized complex ion exchanger is proposed and the exchange properties of Cu (II), Zn (II), Ni (II) ions are determined. The IR spectra and thermal characteristics of the obtained complexing ion exchanger have been investigated.*

Key words: *complexing ion, IR spectroscopy, structure, static exchange capacity, bulk density, thermal characteristics.*

Language: *Russian*

Citation: Abduvaliyeva, M. J., Kasimov, Sh. A., Turaev, Kh. Kh., & Abdunazarov, E. M. (2021). Synthesis and properties of a complex forming sorbent based on carbamide formaldehyde and phenolsulphthaleic acid. *ISJ Theoretical & Applied Science, 11 (103)*, 175-180.

Soi: http://s-o-i.org/1.1/TAS-11-103-9 ***Doi***: https://dx.doi.org/10.15863/TAS.2021.11.103.9

Scopus ASCC: *1605.*

СИНТЕЗ И СВОЙСТВА КОМПЛЕКСООБРАЗУЮЩЕГО ИОНИТА НА ОСНОВЕ КАРБАМИДА ФОРМАЛЬДЕГИДА И ФЕНОЛСУЛЬФОФТАЛЕИНОВОЙ КИСЛОТЫ

Аннотация: *В статье исследуется исследование комплексообразующего ионита на основе мочевины, формальдегида и фенолсульфофталеиновой кислоты. Определено влияние температуры и мольных соотношений исходных материалов на свойства образующегося комплексного ионита. Предложена*

структура синтезированного комплексного ионита и определены обменные свойства ионов Cu (II), Zn (II), Ni (II). Исследованы ИК-спектры и термические характеристики полученного комплексообразующего ионита.

Ключевые слова: *комплексообразующего ионит, ИК-спектроскопия, структура, статическая обменная емкость, насыпной вес, термические характеристики.*

Введение

В настоящее время разработка надежных методов экологического контроля качества окружающей среды является одной из приоритетных задач аналитической химии. Изучена возможность применения полимерных хелатообразующих сорбентов [1]. Наука о полимерах и промышленность развиваются главным образом, путем создания и исследования гетерофазных структур [2].

Известно, что большинство ионитов поликонденсационного типа получают взаимодействием фенола, резорцина, пирогаллола, оксибензойной кислоты с формальдегидом [3]. Изучен процесс комплексообразования ионов Cu(II), Zn(II), Cd(II) с синтезированным хелатообразующим сорбентом КФГГ [4], ковалентного закрепления на матрице карбамид формальдегидной смолы: 2-аминопентандиовой кислоты [5], дитизона [6], ортофосфорной кислоты [7] , ковалентно закрепленный способом in situ O,O-ди-(2-аминоэтил)-дитиофосфата калия на полиэфирной матрице, обладающей комплексообразующими свойствами с катионами d-металлов [8]. Методом классической полярографии изучена сорбция ионов Pb^{2+} из растворов $Pb(NO_3)_2$ новой хелатирующей катионной смолой, синтезированной на основе глицидилметакрилата, метилметакрилата с нефтяным битумом и гидроксиэтилендифосфоновой кислотой [9]. В статье [10] проведен термогравиметрический анализ модифицированного сорбента, исследованы условия сорбции ионов тяжёлых металлов на модифицированном сорбенте. Изучена кинетика сорбции меди, цинка и кадмия полимерным комплексообразующем сорбентом. [11] сополимер малеинового ангидрида-стирола модифицирован в присутствии 4-амино-2-тиоурацила и формальдегида и получен новый полимерный сорбент с пространственной структурой.

Целью исследования является синтез и исследование сорбента, полученного поликонденсацией на основе карбамида, формальдегида и фенолсульфофталеиновой кислоты, а также изучение его сорбционного свойства.

Экспериментальная часть.

Объектом исследования является полученный сорбент на основе карбамида, формальдегида с фенолсульфофталеиновой кислотой (ФСФ) и изучение его сорбционных свойств. Изучены влияние температуры поликонденсации на свойства сорбента а также удельный объём набухшего в воде сорбента и статическая объёмная ёмкость. ИК-спектроскопические исследования проводили на инфракрасном ИК-Фурье спектрометр IRTracer-100 SHIMADZU (Япония) (диапазон 400-4000 $см^{-1}$, разрешение 4 $см^{-1}$), порошкообразным методом. Для определения стойкости сорбента на температуру был сделан термический анализ на приборе Netzsch Simultaneous Analyzer STA 409 PG (Германия), с термопарой К-типа (Low RG Silver) и алюминиевыми тиглями. Все измерения были проведены в инертной азотной атмосфере со скоростью потока азота 50 мл/мин. Температурный диапазон измерений составлял 25-370ºC, скорость нагрева равнялась 5К/мин. Количество образца на одно измерение 5-10 мг. Измерительная система калибровалась стандартным набором веществ KNO_3, In, Bi, Sn, Zn.

В работе применялись реактивы марки «ч» и «х.ч.». Растворы реактивов готовились растворением точной навески в известном объеме растворителей.

Синтез сорбента.

В трехгорлую колбу, оснащенную хладагентом и автоматической мешалкой для синтеза комплексообразующего ионита на основе смол, модифицированных мочевиной формалином (смесь 40% формальдегида, 52% воды и 8 метилового спирта) с реагентами, содержащими серу и кислород, добавляли 12 г (0,2 моль) мочевины и растворяли при 42 ° С, добавляя 39 мл (0,5 моль) формалина. Затем по каплям добавляли водный раствор 7 г (0,02 моль) фенолсульфофталеиновой кислоты и реакционную смесь интенсивно перемешивали при нагревании до температуры 95–100 ° С. В результате через 1–1,5–2 часа образуется желтовато-оранжевая смолистая масса. Полученную смолистую массу вылили в фарфоровую чашу и высушили в печи при 80-85 ° С в течение 24 часов. Высушенный полимер растирали в ступке, и низкомолекулярные соединения сначала промывали 5% -ным концентрированным раствором NaOH, а затем несколько раз дистиллированной водой. Полученный продукт мелкодисперсный, гранулированный, выход реакции 90%. Для проверки стабильности соединения наблюдали

растворимость в воде и этиловом спирте. Не растворим в воде, но растворяется в этиловом спирте.

Определили влажность синтезированного сорбента по ГОСТ 10898.1–84, насыпной вес по ГОСТ 10898.2–84, плотность сорбента в гидратированном состоянии по ГОСТ 10898.3–84, удельный объём набухшего сорбента по ГОСТ 10898.4–84, статическую обменную ёмкость – ГОСТ 20255.1–89.

Результаты и их обсуждение.

Изучено влияние ионита, полученного на основе мочевины, формальдегида и фенолсульфофталеиновой кислоты, при различных температурах. Поликонденсацию анализировали при 80, 85, 95 и 100 ° С. Кроме того, устанавливали продолжительность реакции, удельный объем иона в воде и значение статической обменной емкости (СОЕ) для 0,1 н раствора NaOH. Оптимальная температура поликонденсации 95 ° С, время реакции 1,5–2 ч, реакция гомогенная, обменная емкость по 0,1 н. раствору NaOH 4,1 мг. экв / г. Данные приведены в таблице. 1.

Таблица 1. Влияние температуры поликонденсации на свойства сорбента.

№	Температура реакции t, °С	Продолжительность реакции τ, час	Удельный объём набухшего в воде сорбента в Н-форме, мл/г	Обменная ёмкость СОЕ, по 0,1 N р-ру NaOH мг-экв/г
1.	80	2,5-3	1,64	2
2.	85	2-2,5	1,60	3,1
3.	95	1,5-2	1,41	4,1
4.	100	1-1,5	1,23	3,5

В реакции поликонденсации молярное соотношение реагентов: мочевина, формальдегид и фенолсульфофталеиновая кислота составляло от 2: 5: 0,1 до 2: 5: 0,3 соответственно.

Когда мы проследили результаты анализа по таблице 2, было определено, что наилучшее соотношение ионного обмена составляло 2:5:0,2 для мочевины, формальдегида и фенолсульфофталеиновой кислоты соответственно.

Таблица 2. Зависимость сорбционных свойств ионита от соотношения реагентов

Соотношение карбамида: формальдегида: фенолсульфофталеиновая кислота, в молях	Насыпной вес, г/мл	Статическая обменная ёмкость по 0.1 н растворам, мг-экв/г:		
		Cu^{2+}	Zn^{2+}	Ni^{2+}
2:5:0,1	0.74	3.8	3.6	3.3
2:5:0,2	0.80	4.3	4.1	4.2
2:5:0,3	0.82	3.2	3.5	3.7

Исследована ИК-спектроскопия синтезированного ионита. По ИК-спектрам определены следующие частоты колебаний. Линии в области 3297 $см^{-1}$ соответствуют колебаниям первичных групп R-NH_2, а на высоте 2954-2891 $см^{-1}$ они указывают на связывание группы R-SO-OH. В области 1622-1496 $см^{-1}$ наблюдаются резонансы образования группы R - NH_3^+. Ароматические аминокислоты образуются при колебаниях 1286 $см^{-1}$, присутствие группы C-H в областях 1010-803 $см^{-1}$ видно из кривых. Данные приведены в рисунок. 1.

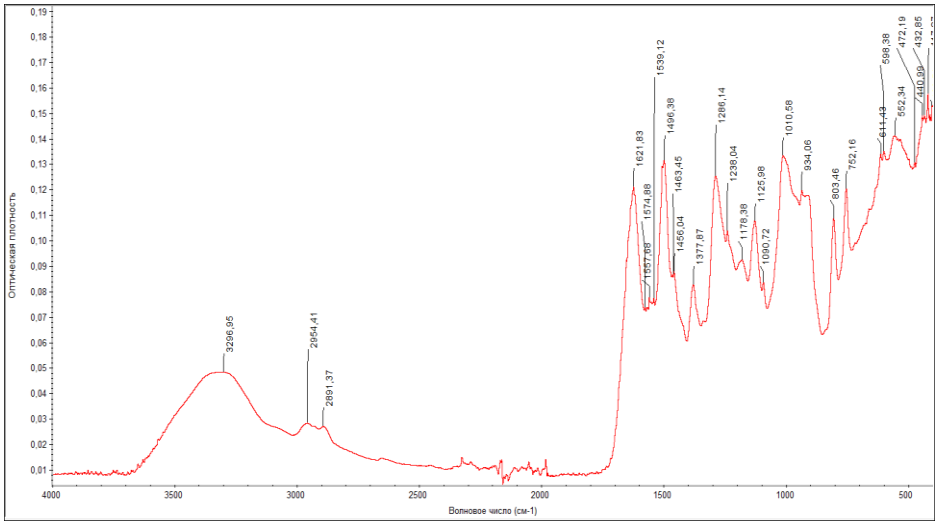


Рис. ИК-спектр соединения, образованного фенолсульфофталеиновой кислотой с полученной смолой.

Согласно результатам анализа дифференциальной сканирующей калориметрии, изменение массы с нарушением структуры соединения при нагревании сорбента анализируется путем наблюдения различных экзотермических и эндотермических эффектов.

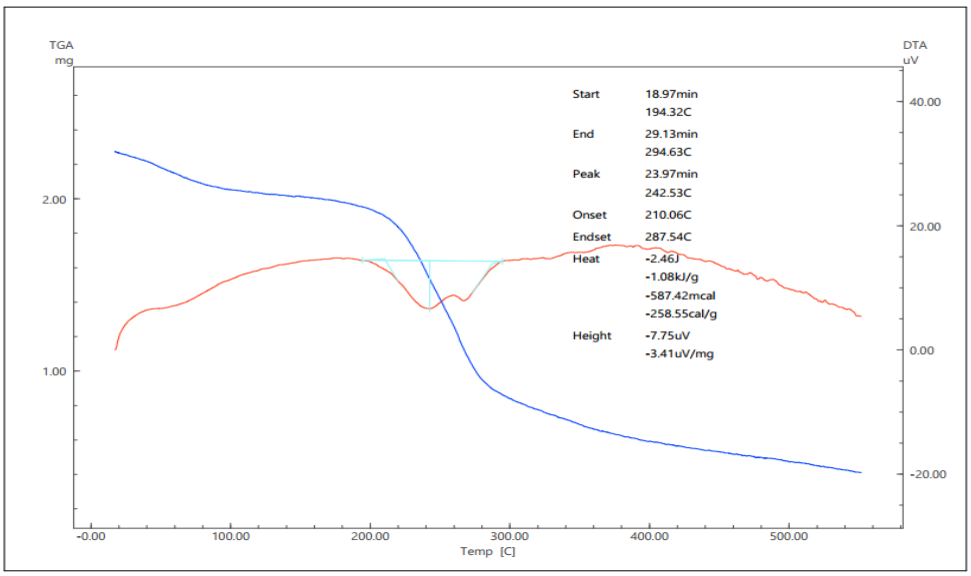
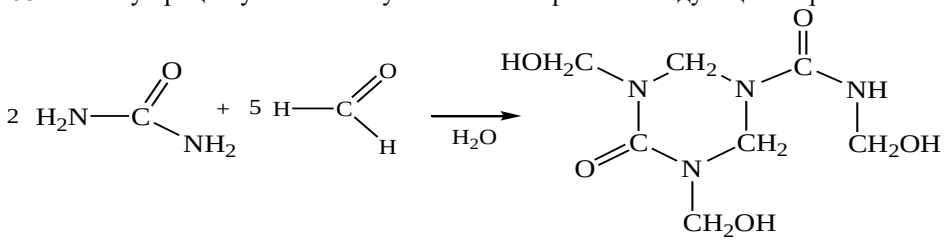
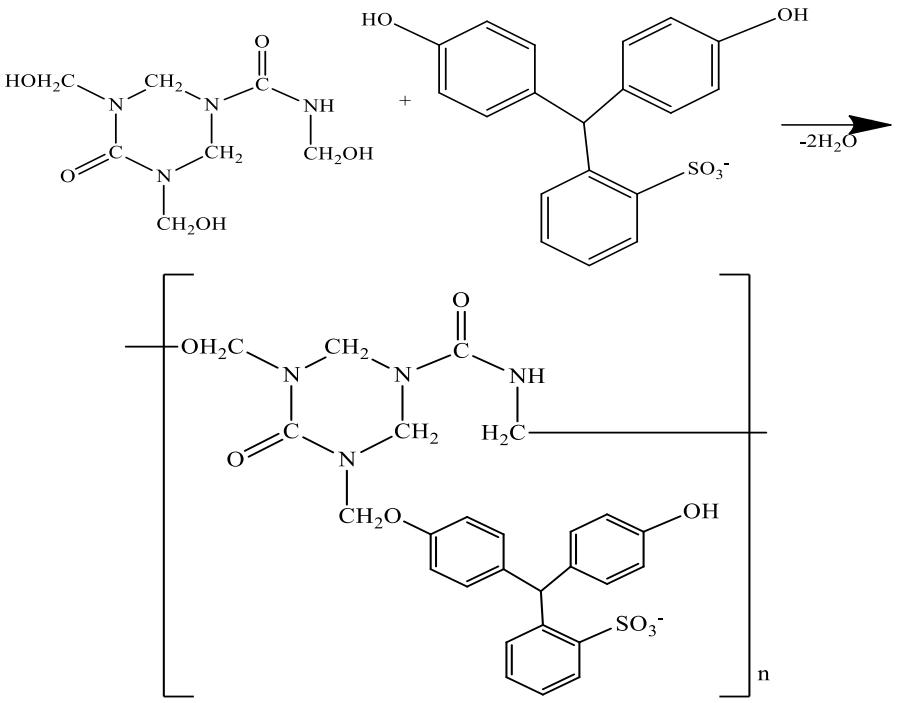


Рис.2. ДСК-ТГ-ДТГ график сорбента.

Наблюдения диаграмм ДСК-ТГ-ДТГ комплексообразующего иона показывают два эндотермических пика в интервале температур 194–295 °C. Первый указывает на то, что сорбент растворяется при 180 °C. Температура разложения началась с 242,43 °C. В интервале температур 190,32–296,47 °C уменьшение массы образца составило 48-68%. Этому процессу соответствуют два эндотермических пика. Полная энтальпия разложения ΔQ=-1,08 кДж / г. Данные приведены на рисунке 2.

Согласно результатам анализа и литературным данным [5], реакция синтеза ионита, образованного из формальдегидмочевины и фенолсульфофталеиновой кислоты, может быть выражена следующим образом:





Выводы.

Получен комплексообразующий ионит на основе реакции поликонденсации мочевины, формальдегида и фенолсульфофталеиновой кислоты. Определены оптимальные условия синтеза ионита МФФСФ и изучено влияние мольных соотношений исходных материалов на состав и физико-химические свойства синтезированного ионита. Предложены структуры и реакции комплексообразования ионита. Исследованы ИК-спектры и термические характеристики синтезированного ионита.

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SOI: 1.1/TAS DOI: 10.15863/TAS
International Scientific Journal
Theoretical & Applied Science
p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)
Year: 2021 **Issue:** 11 **Volume:** 103
Published: 06.11.2021 **http://T-Science.org**

QR – Issue QR – Article

Abdukodir Khamidovich Toshkulov
Ministry of Higher and Secondary Special Education of the Republic of Uzbekistan
Doctor of Economics, Associate Professor

IMPROVING THE SYSTEM OF TAX INCENTIVES TO STIMULATE THE ECONOMIC ACTIVITY OF AGRICULTURAL ENTERPRISES

Abstract: *The article discusses the system of tax incentives to stimulate the economic activity of agricultural enterprises.*

Key words: *economics, tax, agriculture.*
Language: *English*
Citation: Toshkulov, A. Kh. (2021). Improving the system of tax incentives to stimulate the economic activity of agricultural enterprises. *ISJ Theoretical & Applied Science, 11 (103)*, 181-191.
Soi: http://s-o-i.org/1.1/TAS-11-103-10 ***Doi***: crossref https://dx.doi.org/10.15863/TAS.2021.11.103.10
Scopus ASCC: *2000.*

Introduction

The main content of the agricultural policy of most developed countries today is the state support of agriculture through various subsidies, grants and benefits.

The issues of improving the system of tax incentives and assessing the effectiveness of stimulating the economic activity of agricultural enterprises are relevant throughout the tax system of Uzbekistan. They play an important role today in the context of global instability and international political risks.

For this reason, the President of the Republic Sh.M.Mirziyoev said: "Our most important task is to reform the management system of the agricultural sector, the introduction of advanced technologies for the rational use of land and water resources, food security ... At the same time, grain and fruit - It is necessary to comprehensively develop the activities of vegetable clusters. Given that this area is relatively new to us, it needs to be supported by the state, including the simplification of the credit system, cost subsidies, revision of procedures related to land allocation. The goal of agricultural reforms is to ensure food security and increase the welfare of the people, along with economic benefits. We must never forget that. "[1]

Regulation of agricultural enterprises through taxes is one of the most important indirect methods. This is because taxes with optimal forms and rates are more efficient, less likely to stimulate inflation, and also have a direct impact on the economic growth of farms. Typically, the main means of regulating the activities of agricultural producers through taxes is tax incentives. In this area, they have a wide range of influence, for example, regulate the volume of investments, scientific and technological progress and the development of social security of the rural population. However, the taxation of agricultural enterprises has its own characteristics associated with a relatively high level of production and financial risk, as well as low profitability.[2]

General features of taxation in agriculture in sectors of the economy have been studied in the works of A.Smith, D.Ricardo, D.Mill and others. In particular, based on the work of D. Mill, the following types of agricultural taxes can be distinguished and

[1] Mirziyoev Sh.M. Address of the President of the Republic of Uzbekistan to the Oliy Majlis on the most important priorities for 2019. 28.12.2019 y. www.uza.uz.

[2] Grinkevich L.S., Ivanova Yu.N. Development of methods of tax regulation of the activities of enterprises APK. Monograph - Tomsk: Izdatelskiy Dom TGU, 2014. - 152 p.

their level of impact on agricultural producers can be assessed.[3]

1. Tax for priority needs. As a result of the introduction of this tax, the price of the product will increase. The researcher notes that this could lead to two consequences. First, consumption of agricultural products is declining; consumers will be forced to consume more manufactured products; less productive (worst) sections are not used. Second, there is an increase in wages over the amount of tax. According to Mill, this tax will worsen the living conditions of workers or lead to the withdrawal of additional funds from capital owners (in addition to the tax amount).

2. Tax levied as a fixed share of production. This tax is similar to taxes levied in kind. It is noteworthy that the established tax ("tithe per grain") is levied by the researcher on the goods tax, not on the category of taxes based on land rent. The author notes that when analyzing the change in the supply of the product (grain) collected in the form of a tithe tax, it leads to an increase in prices. As a result, tithes on grain are paid by the end consumer, not by the landowner, as is the tax levied in any form.

3. Land tax based on land rent. This option of taxation does not lead to an increase in prices, a decrease in consumer demand. It is paid for by landowners and is not transferred to consumers.

At present, the system of taxation of agricultural producers does not sufficiently take into account the specifics of the industry and the financial condition of taxpayers, does not harmonize the interests of the state and taxpayers, so tax reforms in agriculture do not give the desired effect. Therefore, it is necessary to take into account the following when developing methods and specific mechanisms of regulation of agricultural producers through taxes:[4]

- specific features of the network;
- the need to stimulate investment activity;
- the need to apply a slightly simplified procedure for collecting lower rates and taxes.

Tax regulation of agricultural producers is determined by the priorities of national agro-industrial policy, specific natural, human and material resources in agriculture, as well as the inability of most agricultural enterprises to self-regulate and expand production.

[3] Mill Dj.S. Osnovy politicheskoy ekonomii i nekotorye aspecty ix prilojeniya k sotsialnoy filosofii. M., 1981. T. 3.

[4] Ivanova Yu.N. Tax regulation of agro-industrial complex enterprises //Entrepreneurship and innovation: regional priorities and development prospects: interuniversity materials. scientific-practical conf. Barnaul,2012.S. 44

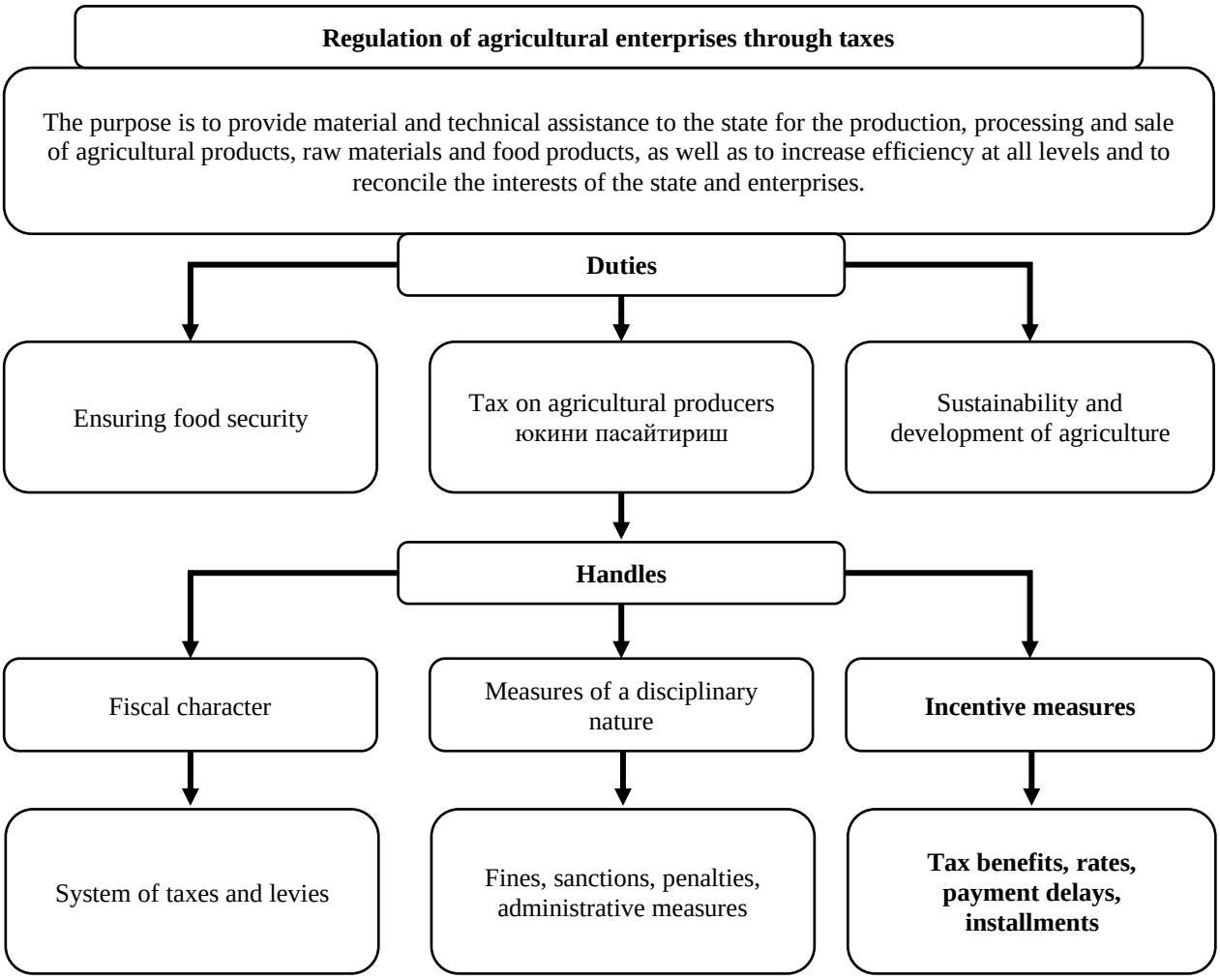

Figure 1. The system of regulation of agricultural enterprises through taxes[5]

Our analysis now allows us to say that a systematic approach to the regulation of agricultural enterprises through taxes should harmonize its goals, objectives and means of regulation (Figure 1).

Agriculture is one of the key sectors in ensuring the economic stability of the country and has an important social and economic significance. In the process of agricultural reform, the state provides all possible assistance and benefits to producers. In particular, a number of measures have been taken to finance and lend to farms, which have become a leading force in the agricultural sector, and to further improve the system of mutual settlements with suppliers and service providers of material resources.[6] As of January 1, 2019, 49.4% of our compatriots live in rural areas, and the share of agriculture in GDP is 19.7%. At the same time, the number of enterprises specializing in agriculture is more than 157 thousand, which is 40.6% of the total number of enterprises and 27.3% of the economically active population work in this field.[7]

[5] Based on research by the author.

[6] Official website of the Ministry of Agriculture of the Republic of Uzbekistan. https://www.agro.uz/

[7] Data of the State Statistics Committee of the Republic of Uzbekistan. www.stat.uz

In order to stimulate competitive production, support entrepreneurship and a healthy competitive environment in the country, expand and stimulate the country's export potential, as well as to provide the domestic market with quality consumer goods, the tax system will be accelerated and taxed.[8]

First of all, we will consider the tax benefits provided to agricultural enterprises in order to stimulate their economic activity. In particular, in accordance with Article 428 of the Tax Code of the Republic of Uzbekistan in the new edition, the agricultural land used by research institutes in the field of agriculture for direct scientific and educational purposes, as well as agricultural land, are of great importance. and other crops and trees used for scientific and educational purposes, the subjects of which are approved, are exempt from tax. However, under this article, newly developed lands for agricultural purposes, lands with drip irrigation and existing irrigated lands for reclamation are exempted from paying taxes for five years.[9]

In addition, the Decree and Resolutions of the President of the Republic of Uzbekistan provide a number of tax benefits to stimulate the economic activity of agricultural enterprises. In particular, according to the Decree of the President of the Republic of Uzbekistan[10] No. PP-3978 of October 17, 2018, legal entities exporting fruits and vegetables can do so without prior payment, opening a letter of credit, registration of a bank guarantee, and politically and commercially. the right to do so without a license to do so. In this regard, in 2018, more than 32.0 thousand enterprises in the field of agriculture will receive 298811.0 mln. UZS were used.[11]

It is known that in the context of the coronavirus pandemic, the support of agriculture is a process directly related to food security. International organizations are paying close attention to the global agricultural pandemic's agricultural production and, ultimately, to global food security.

During the coronavirus pandemic in our country, a number of decrees of the President of the Republic of Uzbekistan were adopted to support other sectors of the economy, such as agriculture, through taxes.

The decrees directly related to the introduction of tax benefits are as follows:

In accordance with the Decree of the President of the Republic of Uzbekistan No. PF-5986 of April 27, 2020, financial assistance to employees of enterprises and organizations, including in the form of in-kind assistance in expanding the scope of tax benefits in kind or in the provision of funds for agricultural products. The minimum wage was increased from 4.22 to 7.5 times the minimum wage.

First of all, if we look at the general tax benefits provided to agricultural enterprises, in 2015 they amounted to 101.2 billion. soums, in 2016 it was 219.2 bln. soums, in 2017 - 735.8 bln. soums, in 2018 - 333.9 bln. soums and 990.4 bln. soums in 2019. soums.[12]

[8] Decree of the President of the Republic of Uzbekistan No. PF-5755 of June 27, 2019 "On measures to further regulate the issuance of tax and customs benefits." The newspaper "People's Word", June 28, 2019, No. 131 (7361).

[9] New Tax Code of the Republic of Uzbekistan. National Database of Legal Documents, 31.12.2019, 02/19 / SK / 4256; www.lex.uz

[10] Resolution of the President of the Republic of Uzbekistan dated October 17, 2018 No PP-3978 "On additional measures to increase the efficiency of export of fruits and vegetables." National Database of Legal Documents, October 18, 2018, No. 07/18/3978/2067

[11] Data of the State Tax Committee of the Republic of Uzbekistan.

[12] Decree of the President of the Republic of Uzbekistan No. PF-5986 of April 27, 2020 "On additional measures to support the population and businesses during the coronavirus pandemic." National Database of Legal Documents, 28.04.2020, 07/20/5986/0510

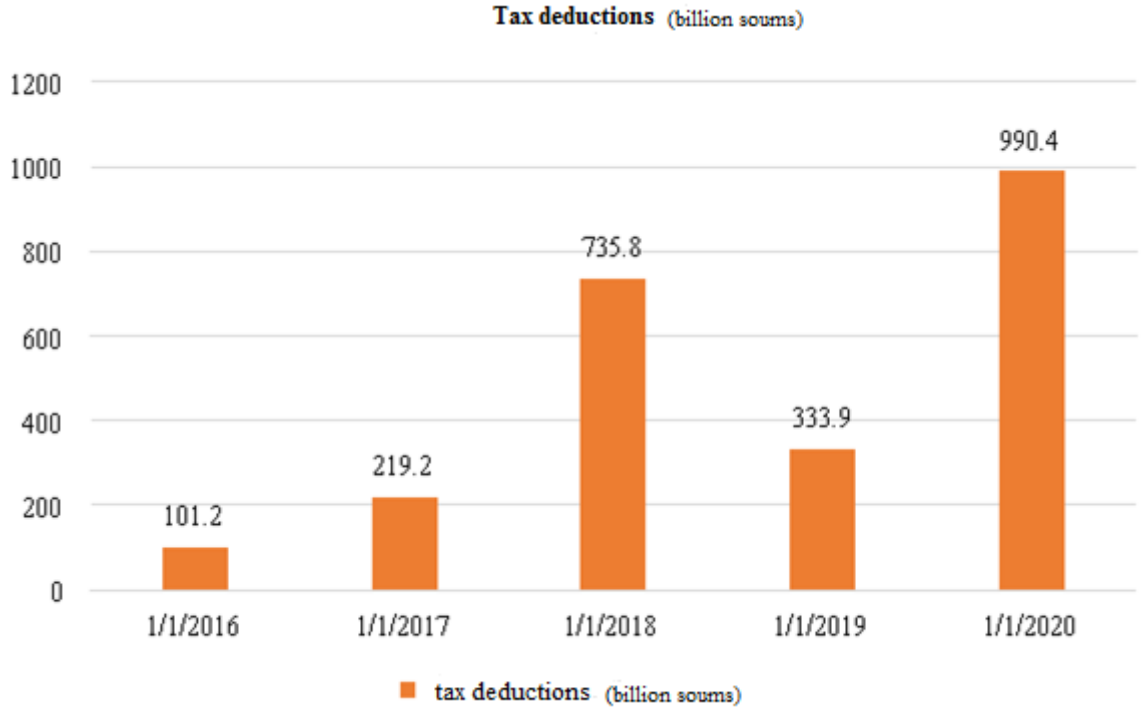

Figure 2.Analysis of general tax benefits provided to agricultural enterprises[13]

If we observe the dynamics of these indicators, the tax benefits were used twice in 2016 compared to 2015, and in 2017 more than 3 times compared to 2016. In 2018, it decreased by more than 2 times compared to 2017, and in 2019, we can observe that almost three times more tax benefits were applied than in 2018. At the national level, as of January 1, 2020, the amount of tax benefits enjoyed by agricultural enterprises amounted to 0.19% of GDP in current prices (Figure 2).

When analyzing the share of tax benefits provided by agricultural enterprises, the share of tax benefits provided by agricultural enterprises in general was 0.8% in 2015, 2.1% in 2016, 4.7% in 2017 and 1.5% in 2018. This means that in recent years, agricultural enterprises have benefited less from tax benefits (Figure 3).

Statistics show that in 2019, the share of annual tax benefits provided to agricultural enterprises in Bukhara region amounted to 76.4 billion soums. soums, in Jizzakh region - 48.7 bln. soums, in the Kashkadarya region - 61.7 bln. soums, in Navoi region - 28.5 bln. soums, in Namangan region - 81.9 bln. 55.9 billion soums in the Republic of Karakalpakstan. 78.7 billion soums in Samarkand region soums, in Syrdarya region - 18.4 bln. soums, in Surkhandarya region - 41.8 bln. soums, in Fergana region - 59.1 bln. soums, in Khorezm region - 68.4 bln. soums. In Tashkent region, agricultural enterprises benefiting from the highest tax benefits received 156.3 billion soums. 112.4 billion soums in Andijan region soums, and in Tashkent - 102.2 bln. soums. The lowest rates are in Syrdarya, Surkhandarya, Navoi and Jizzakh regions (Figure 4).

[13] Compiled by the author on the basis of the State Tax Committee of the Republic of Uzbekistan.

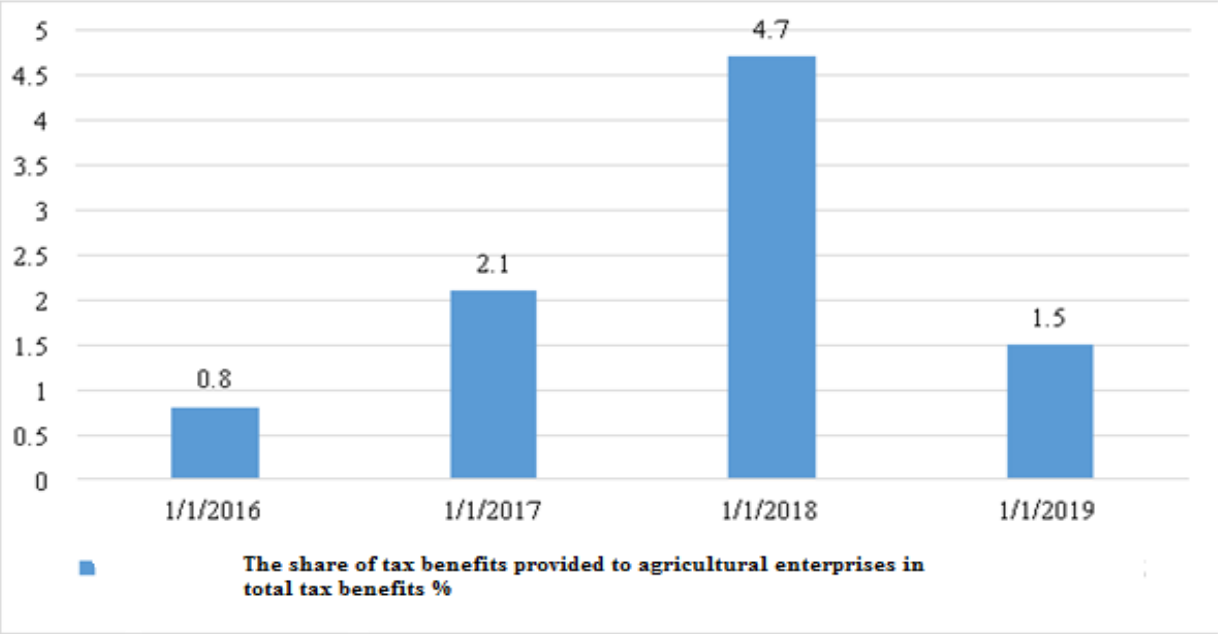

Figure 3. Share of tax benefits provided to agricultural enterprises in total tax benefits[14]

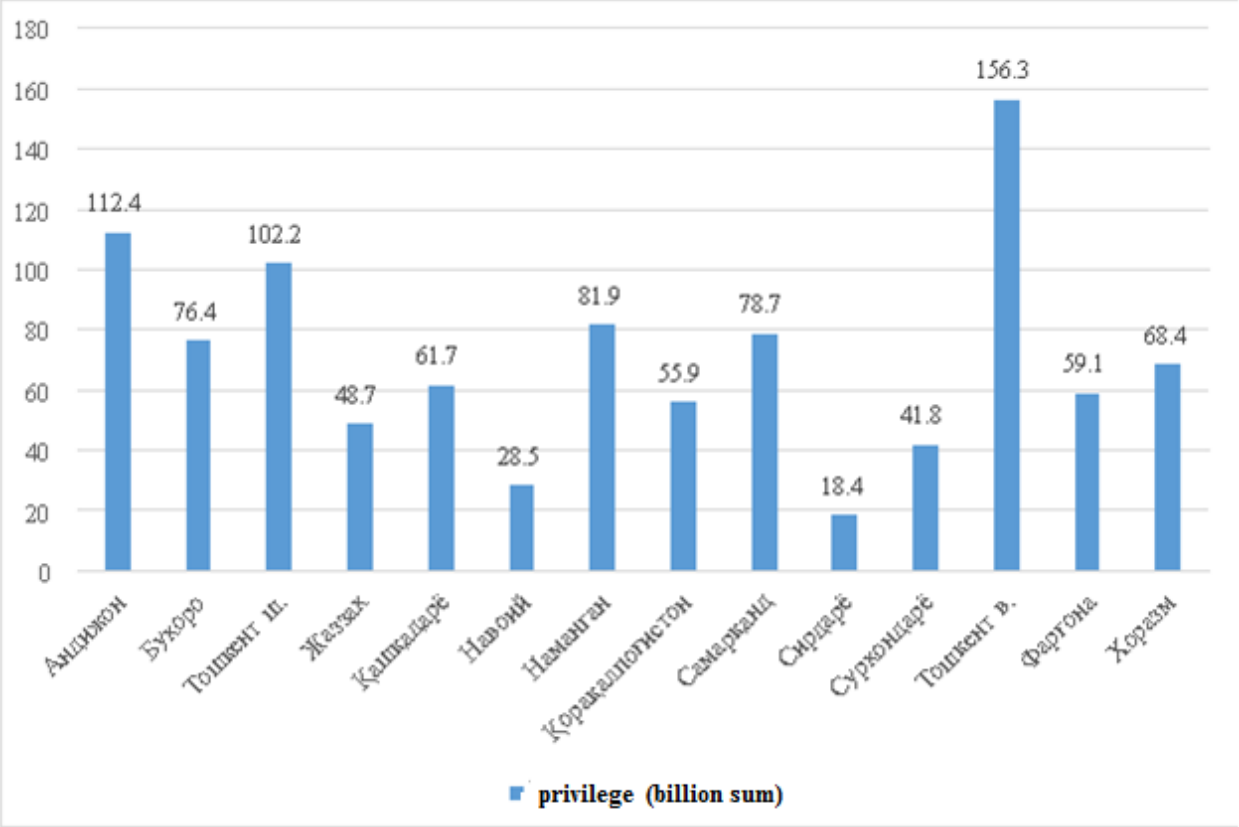

Figure 4. Territorial analysis of tax benefits provided to agricultural enterprises in 2019[15].

When analyzing these tax benefits by type of tax, in 2019, 387.1 billion from the value added tax (VAT) on agricultural enterprises. soums, 248.3 bln. soums from income tax on work of individuals. soums, 164.3

[14] Compiled by the author on the basis of the State Tax Committee of the Republic of Uzbekistan.

[15] Compiled by the author on the basis of the State Tax Committee of the Republic of Uzbekistan.

bln. soums from the single social payment. soums, 139.4 bln. soums from the single land tax. soums and other tax types for a total of 51.3 bln. It turned out that tax benefits in the amount of UZS were provided. Of course, the highest share of tax benefits for the types of taxes used corresponds to the value added tax (Figure 5). This, in turn, can hinder the formation of a healthy competitive environment among agricultural producers and lead to a break in the value chain.

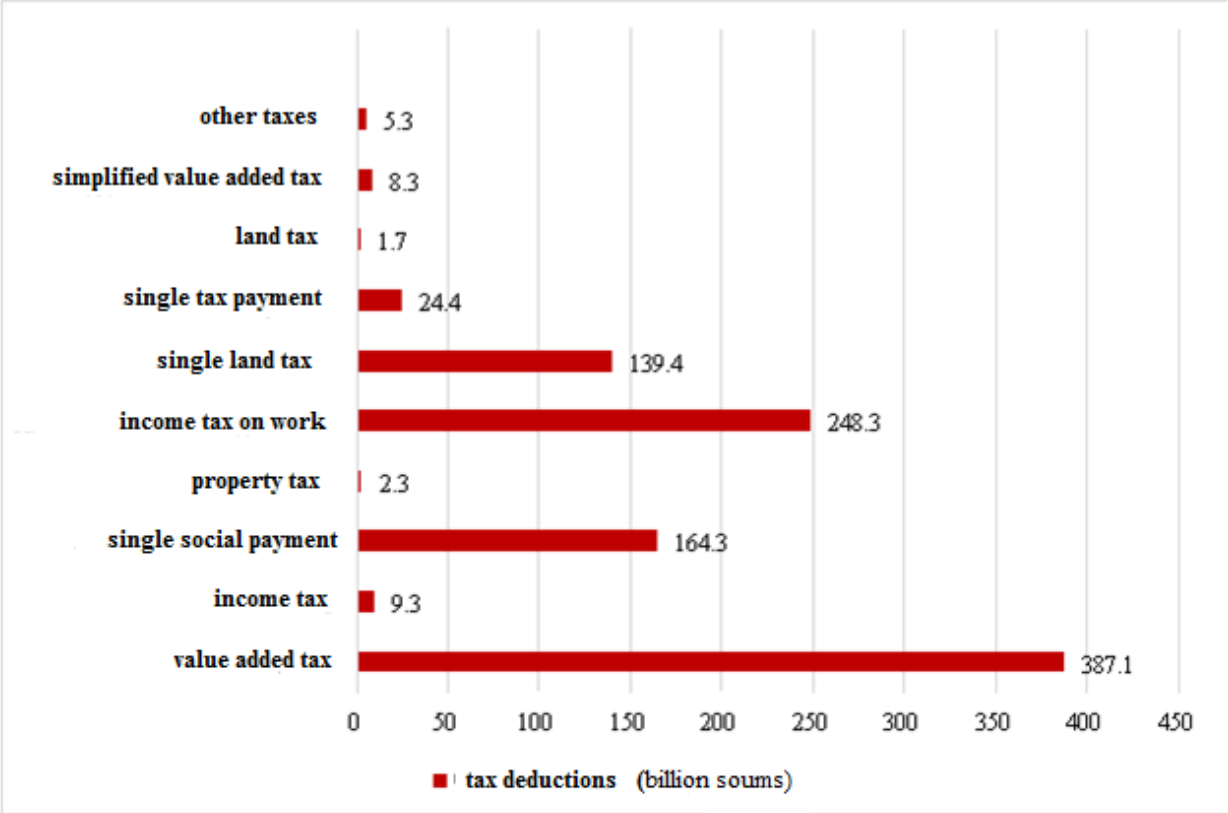

Figure 5. Analysis of tax benefits provided to agricultural enterprises in 2019 by type of tax[16]

At the same time, the analysis of the tax benefits provided to agricultural enterprises in 2015-2019 in the section of normative legal documents shows that the total tax benefits in 2016 are 83% higher than in the current year, which is provided for in the Tax Code. per cent, 94.6 per cent in 2017, 77.3 per cent in 2018 and 61.5 per cent in 2019. This dynamics shows that the number of tax benefits provided for in the Tax Code is declining.

[16] Compiled by the author on the basis of the State Tax Committee of the Republic of Uzbekistan.

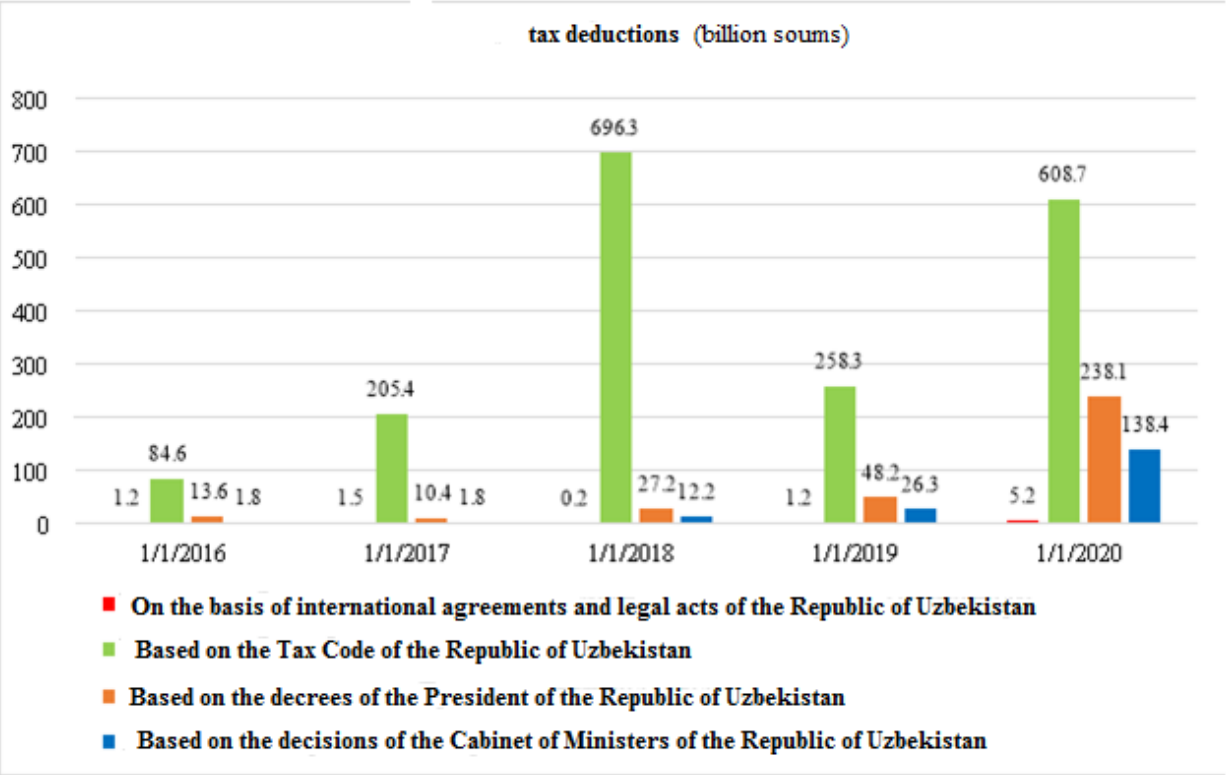

Figure 6. Analysis of tax benefits provided to agricultural enterprises in 2015-2019 in the section of regulatory legal documents [17]

This, in turn, is one of the important factors in stimulating the economic activity of agricultural enterprises by improving the system of tax benefits (Figure 6).

Regulation of certain activities through taxes, including incentives, is carried out in accordance with the rules and norms established by law. Ensuring the robustness, transparency, accuracy of tax legislation, compliance with each other and the generally accepted principles of taxation can not only effectively regulate and encourage taxation, but also encourage and encourage certain activities.[18]

It should be noted that the existing disparities in the current procedure for calculating and paying value added tax, given the significant benefits and preferences for businesses in some sectors of the economy, do not allow to create a full chain of value added tax and increase the competitiveness of the economy[19].

Given the economic nature of value added tax, we consider it appropriate to abolish the established value added tax exemptions for agricultural products produced by economic entities in order to create equal conditions for all business entities.

At the same time, in our opinion, in order to create a full chain of value added tax, in connection with the transition of agricultural producers to the payment of value added tax, incentives for producers of raw cotton should be based on value added tax and and other work, we believe that value added tax on services should be taken into account.

We substantiate this through our analysis of the economic performance of agricultural enterprises in Surkhandarya region. Based on the analysis in Table 1, as a result of the introduction of VAT in agricultural enterprises of Surkhandarya region from October 2019, additional revenues from value added tax to the total budget in 2019 amounted to 114476.5 mln. soums.

[17] Compiled by the author on the basis of the State Tax Committee of the Republic of Uzbekistan.

[18] Giyasov SA Effective use of tax benefits to stimulate innovation and investment activity. Monograph. - T .: Finance, 2020. 194 p.

[19] Decree of the President of the Republic of Uzbekistan dated June 27, 2019 No PF-5755 "On measures to further regulate the provision of tax and customs benefits." "Khalq so'zi" newspaper, 28.06.2019, issue 131 (7361).

Table 1. The effectiveness of the introduction of VAT in agricultural enterprises of Surkhandarya region from October 2019 [20]

Regions	Price of raw cotton before VAT (average)	Total costs	Amount or share of VAT raw materials in the cost, average (mineral fertilizers, fuels and lubricants and other works, services)	Prices for raw cotton after VAT with VAT (average)	Additional revenues to the budget on VAT
Termez sh.	0	0,0	0,0	0	0,0
Angor	3,2	10315,2	6085,9	4,3	1547,3
Oltinsoy	3,2	77026,3	45445,5	4,3	11553,9
Boysun	3,2	20965,7	12369,8	4,3	3144,9
Muzrabod	3,2	23717,6	13993,4	4,3	3557,6
Denov	3,2	97409,4	57471,5	4,3	14611,4
Jarqorgon	3,2	74692,2	44068,4	4,3	11203,8
Kumkurgan	3,2	90886,8	53623,2	4,3	13633,0
It's funny	3,2	15644,4	9230,2	4,3	2346,7
Sariosiyo	3,2	42614,8	25142,8	4,3	6392,2
Termiz	3,2	33477,8	19751,9	4,3	5021,7
Sherobod	3,2	110561,2	65231,1	4,3	16584,2
Salty	3,2	77696,1	45840,7	4,3	11654,4
Long	3,2	40773,7	24056,5	4,3	6116,1
Bandixon	3,2	47395,4	27963,3	4,3	7109,3

Table 2. Effectiveness of the introduction of the general procedure for agricultural enterprises from 2019 (based on the data for six months of 2020) [21]

Regions	Total number of agricultural enterprises	Including more than 50 acres	The number of agricultural enterprises that pay taxes in the prescribed manner	Number of agricultural enterprises that pay turnover tax
Termez sh.	6	1	3	3
Angor	203	33	38	165
Oltinsoy	665	94	105	560
Boysun	399	13	10	389
Muzrabod	370	258	314	56
Denov	618	224	317	301

[20] Compiled by the author on the basis of data from the Tax Department of Surkhandarya region.

[21] Compiled by the author on the basis of data from the Tax Department of Surkhandarya region

Jarqorgon	273	165	165	108
Kumkurgan	361	196	200	161
It's funny	384	312	299	85
Sariosiyo	605	104	139	466
Termiz	212	75	92	120
Sherobad	597	270	337	260
Salty	330	153	175	155
Long	324	74	101	223
Bandixon	231	0	158	73
Jami	**5578**	**1972**	**2453**	**3125**

As of January 1, the total number of agricultural enterprises was 5,578, including 1,972 with an area of more than 50 hectares, the number of agricultural enterprises that pay taxes in the general order was 2,453, and the number of agricultural enterprises that pay turnover tax was 3,125 (2- table). Analyzing the effectiveness of the introduction of the general order of agricultural enterprises in Surkhandarya region from 2019, the highest rate in the region falls on Altynsay district, where the total number of agricultural enterprises is 665, including 94 with a land area of more than 50 hectares. The number of paying agricultural enterprises was 105, the number of agricultural enterprises paying turnover tax was 560.

Economic mechanisms such as budget-tax (fiscal), monetary (monetary), structural-investment, price and public procurement, forecasting, indicative planning, targeted programming are effective in the system of mechanisms of state regulation of agriculture. For the sustainable development of agriculture and rural areas, it is necessary, first of all, to increase public spending and make maximum use of the multiplier effect of fiscal policy (fiscal expansion).[22]

Based on our research, we believe that in connection with the introduction of a turnover tax from 2020, it is advisable to maintain the general tax regime for agricultural enterprises with 50 and more hectares of irrigated agricultural land.

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Signed in print: 30.11.2021. Size 60x84 1/8

«Theoretical & Applied Science» (USA, Sweden, KZ)
Scientific publication, p.sh. 76.125. Edition of 90 copies.
http://T-Science.org E-mail: **T-Science@mail.ru**

Printed «Theoretical & Applied Science»