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### MODERN TECHNOLOGIES FOR QUALITY MANAGEMENT OF SERVICES AND WAYS OF THEIR IMPLEMENTATION AT ENTERPRISES SERVING THE FIELD OF ROAD CONSTRUCTION

In modern conditions of increased competition, the imposition of sanctions by unfriendly states against the Russian Federation, the economic crisis, the political component – all these factors greatly affect domestic enterprises; the question arises of the survival of companies. Domestic companies need to produce their products and cease to depend on the Western component; these products and services must comply with the excellent system.

**Keywords:** quality management, quality management system, road construction.

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### СОВРЕМЕННЫЕ ТЕХНОЛОГИИ УПРАВЛЕНИЯ КАЧЕСТВОМ УСЛУГ И ПУТИ ИХ РЕАЛИЗАЦИИ НА ПРЕДПРИЯТИЯХ, ОБСЛУЖИВАЮЩИХ СФЕРУ ДОРОЖНОГО СТРОИТЕЛЬСТВА

В современных условиях усиление конкуренции, введение санкций недружественными государствами в отношении Российской Федерации, экономический кризис, политическая составляющая – все эти факторы очень сильно влияющая на отечественные предприятия. В связи с этим встаёт вопрос о выживании компаний. Отечественным компаниям необходимо производить свою продукцию и переставать зависеть от западной составляющей, данная продукция и услуги должны соответствовать системе мирового уровня. Качество продукции необходимо закладывать в процессе изготовления продукции, следовательно, главным ключом его поддержания и центральным элементом способности в конкурентов производителей является актуальность системы менеджмента качества, которая существует на предприятиях, занимающихся дорожным строительством. Всё выше сказанное приводит к поэтапному увеличению роли системы менеджмента качества в фирме.

**Ключевые слова:** управление качеством,

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Today, roads in the Russian Federation lag 40-50 years behind the highways of leading foreign countries in their technical development and, consequently, innovative activities for road construction.

Innovative development of roads in construction implies the use of upgraded technologies, modern materials and machinery that have high performance, the main purpose of which when implemented in road construction is to show reliability, durability, which will increase the service life of roads.

The emergence and emergence of an interest in the issue of quality management emerged with the development of mass industrial production.

An enterprise's quality management system is a system of standards that are implemented in an organization to improve production levels and comply with global standards. The quality management system (QMS) is part of the overall management system of an enterprise, which ensures the stability of the quality of products or services.

The purpose of the quality management system is to set out the requirements for the management system and to monitor their implementation.

It should be noted that the quality management system also usually includes an economic aspect, i.e. an examination of the total relationship between the organization's economic performance and its output, by looking at the costs of producing quality products and comparing them with the losses which occur when products of inadequate quality are produced [1].

Nowadays, ensuring the quality of products manufactured by a company is a very important task. Quality determines the competitiveness and viability of a company, as well as its efficient operation.

Profit maximization is also impossible without maintaining and improving the quality of products to meet the requirements of certain standards and the wishes of consumers. Therefore, quality management is a very important task.

In the Russian Federation, it is quite common to have a quality certificate as a prerequisite. This document will definitely be required by participants in tenders, public procurements and quality competitions. In addition, it may also be required by some customers [2].

Thus, at present, a large number of enterprises are still pursuing a control-based approach to quality management. However, external and internal conditions are forcing the transformation of quality management from a method of defect control to a real management activity.

In order to understand how important the quality management system is to the company's management system, it should be noted that all functions of the company are divided into three groups, as illustrated in Figure 1:

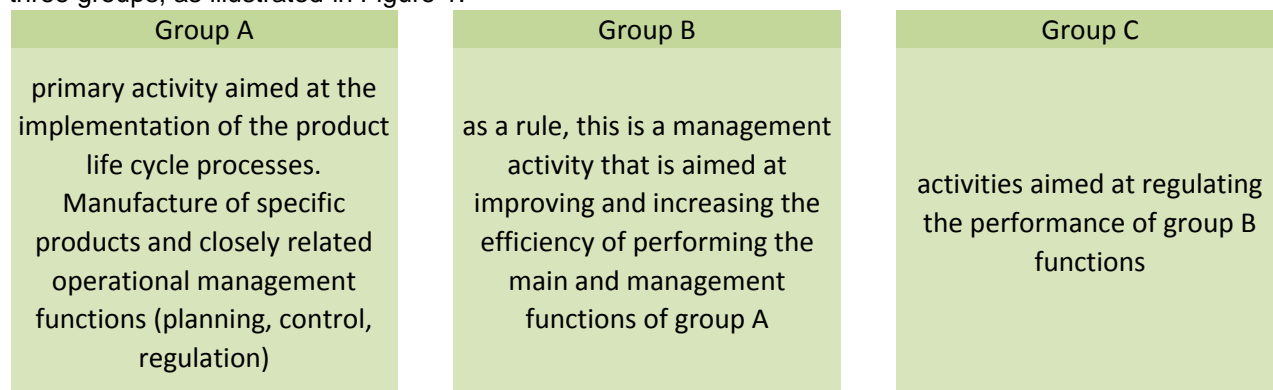


Figure 1 – Enterprise functions by activity group and their relationship to the quality management system

The quality management system belongs to the latter group of functions. Its purpose is to set the requirements for the management system and to monitor their implementation.

Thus, it is possible to formulate the goal of quality management to achieve long-term success by 18 organization customer satisfaction and ensuring that the results of the company's processes meet the needs of society [1], [3]–[6].

An optimum quality control system should be considered a system that can not only correct defects and deficiencies but also, on the basis of appropriate analysis, determine the cause

of the deviation and formulate scientific and technical solutions. Ensure that defects that could lead to manufacturing defects (GOST, SniP) are corrected in good time.

The quality, however, depends on the materials, the method of laying the bearing layers of the pavement, the seasonality and the timing of road construction. More often than not, construction companies are obliged to lay the pavement within a short time frame, given that the budget is not always sufficiently allocated. For this reason, asphalt pavers often pave in bad weather conditions, such as rain or snow. Premature deterioration of roads occurs due to failure to comply with the rules for the organization of road construction work [2].

Table 1 shows the quality control procedures.

Table 1 – Quality control procedures

Before work commences	During the course of the work	At the final stage	
1. Representation at the site to all stakeholders involved in the road construction process	1. Analyses the completeness and quality of the working documentation, project designs, flow charts, schemes and process regulations. Road construction processes at the site	1. Preparation and handover to the client of the construction control package as stipulated in the terms of reference	
2. determine on site the boundaries of sections, structures and components, as well as the types and quantities of construction and installation work to be monitored	2. analysis of the completeness and correctness of the contractor's production and technical documentation, Conducting random incoming inspection of road construction materials, structures and products directly used on site	2. Conducting – upon agreement with the Client – pre-acceptance diagnostics of the road section to be handed over, as well as participation in the Working and Acceptance Commissions	
3. Approval of the prescriptive form with the customer Familiarization of specialists with the project documentation and technical documentation	4. Assess the correctness of the surveying work	3. Drawing up a final report on the construction control of the construction, reconstruction or overhaul of the facility, containing the final information on the measures taken at the facility of the work and the irregularities detected	
	5. Conducting a quality assessment during random operational checks		4. To monitor the technical and operational condition of the object of construction, reconstruction or overhaul during the warranty period
	6. Assessment of compliance of the works in progress with the actually approved schedules		5. To monitor the technical and operational condition of the object of construction, reconstruction or overhaul during the warranty period
	7. The acceptance inspection shall include the certification of hidden work and intermediate acceptance of critical structures		
	8. Selective photographing of processes, stages of construction, reconstruction or major repairs, - structural elements		
9. Drafting and submitting reports			

In the area of management, full compliance with the requirements of government policy in connection with the Federal Law on Technical Regulation is to be sought and expected. This includes clarifying the functions of the management apparatus, adapting the structure to the objectives set, developing information networks, densifying information flows, and building management by applying the principles of total quality management.

The concept is the basis for the development and formulation of immediate and long-term plans for quality improvement work.

The key to the success of the 'Control' concept must be its in-depth understanding and practical application, professional training and quality assurance training. Quality assurance should be a key objective at all levels of road program implementation.

The main factor that affects product quality is the use of innovative paving materials, which the company does not use, and there is no algorithm by which optimal quality characteristics are found.

Road construction problems are very important in the Russian Federation because every year the number of cars increases and the quality of road structures decreases.

The need for innovative road construction technology is driven by a number of factors:

- the constant increase in the number of vehicles;
- increased traffic flows;

- the high cost of road construction materials and machinery;
- significant repair and construction of district roads to connect settlements;
- traffic safety and environmental standards in road construction.

The following algorithm, shown in Figure 2, is proposed to determine acceptable values for quality characteristics, price levels and problems to be solved.

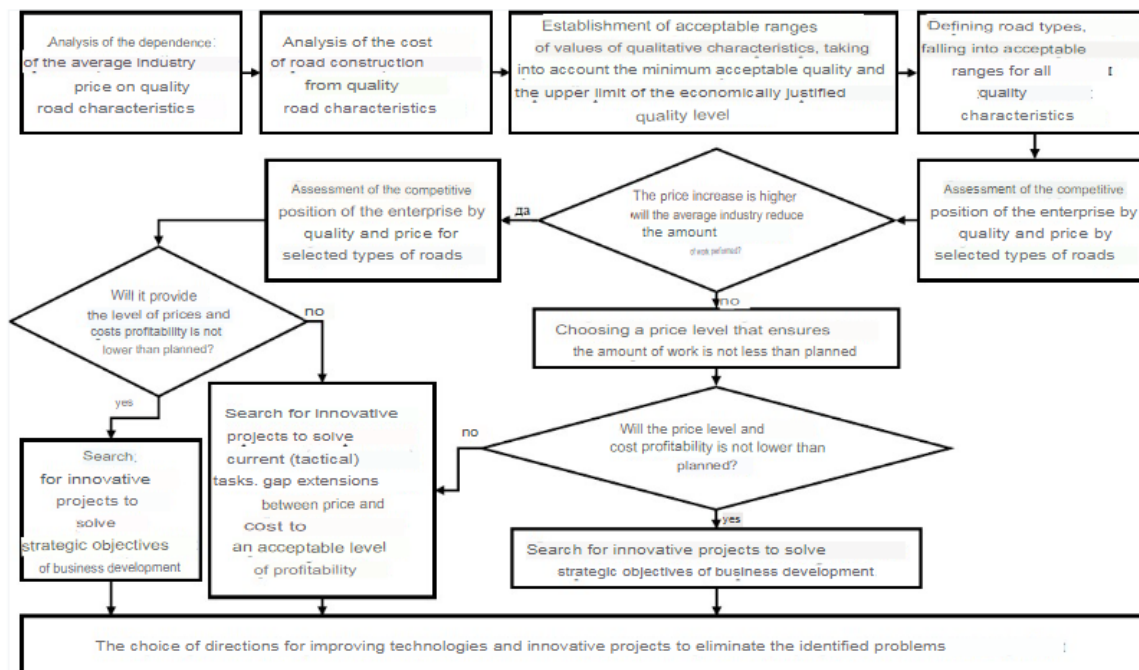


Figure 2 – Algorithm for determining acceptable values for quality attributes, price levels and problems to be solved

The proposed algorithm will enable more informed decisions to be made in choosing areas for its development, to improve precisely those aspects of its activities that need to be changed in the first place, and most importantly will improve the quality of the services offered.

The proposed algorithm will also make it possible to identify more clearly its market position and to take targeted measures to improve it, together with the solution of the problem of increasing the efficiency of its activities and improving quality management.

In order to improve the quality of roads, the following innovative material, expanded clay aggregate, is proposed for use.

Foam stone chips are used for the base course of asphalt pavements. It is a very high quality and most importantly reliable material. No additional equipment is required for its laying – only a roller.

The main properties and advantages of the proposed material are shown in Table 2.

Table 2 – Properties and advantages of cellular glass crushed stone compared to traditional sand

Parameter	Description
Properties	<ul style="list-style-type: none"> <li>– low thermal conductivity;</li> <li>– fire safety;</li> <li>– high strength at a relatively low weight;</li> <li>– durability;</li> <li>– frost resistance (relevant for the Russian climate);</li> <li>– eco-friendliness</li> </ul>
Cost of constructing 1 km of road	15-20 per cent lower than using sand
Labor costs	lower by 15 per cent than using sand
Costs of excavation work	20 per cent lower
Material consumption	half the layer required compared to traditional sand

The table shows that not only does the proposed material have obvious advantages over sand in terms of properties that improve road quality, but also that using this material will optimize costs by substantially reducing them.

In addition, the use of the new material will lead to shorter construction periods.

Most importantly, the quality and lifespan of roads is predicted to improve.

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