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MAIN BUSINESS PROCESSES IN THE ENVIRONMENT OF A SYSTEM APPROACH TO MANAGEMENT OF REPAIRS, RECONSTRUCTIONS OF HIGHWAYS AND BRIDGES

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R.M.Akhmedov

Independent researcher, Namangan State University, Namangan, Uzbekistan

ABSTRACT

The article highlights the essence of the main business processes in the context of a systematic approach to the management of planning and management of repairs, reconstruction of roads and bridges. For the first time, an attempt has been made to systematize the basics of business processes in the context of a systematic approach to the management of repairs and reconstruction of highways and bridges. The main and supporting business processes are considered. The advantages of organizing business processes based on a systematic approach are given.

KEYWORDS

Business process, systems approach, management, planning and management, repair, reconstruction, roads, bridges, main and supporting business processes, advantages.

INTRODUCTION

President of the Republic of Uzbekistan Shavkat Mirziyoyev, having familiarized himself with the presentation on the work in the field of road management and priority tasks for the future in the

industry, emphasized that the international roads of our republic with a total length of 4 thousand kilometers, connecting Andijan with Kungrad, Termez with Tashkent, must meet the highest requirements. In

addition, the Resolution of the President of the Republic of Uzbekistan dated 27.11.2018 No. PP-4035 "ON MEASURES TO IMPLEMENT ADVANCED FOREIGN METHODS OF ORGANIZING WORKS IN THE SPHERE OF CONSTRUCTION AND OPERATION OF MOTOR ROADS" defines the following priority tasks in the field of construction and operation of motor roads in the Republic of Uzbekistan "development of a program for the construction and reconstruction of public roads for the period 2020-2040, taking into account the assessment of the forecast for the long-term socio-economic development of the republic and regions, as well as the most efficient use of the country's transit potential; radical improvement of the policy in the field of financing work on the design, construction, reconstruction and repair of motor roads, including on the terms of public-private partnership; development of recommendations for a comprehensive improvement of state regulation mechanisms in the field of road construction and stimulation of the attraction of private sector resources to the construction and operation of motor roads." In this regard, the development of theoretical foundations for business processes of planning and managing the repair and reconstruction of roads and bridges is a pressing task.

Literature Review

Many scientific studies have been devoted to the problem of business processes for planning and

managing the repair and reconstruction of highways and bridges. Below is an overview of some of them. Studies [1-7] substantiate the relevance of the problem of developing and implementing an economic and mathematical model for determining the optimal service life between repairs for bridges used in the process of planning and managing the repair and reconstruction of highway bridges. Article 8 covers the issues of planning and managing the repair and reconstruction of highway bridges, as well as the development of an economic and mathematical model for optimizing the service life between repairs. The methodology consists of studying the processes of interdependence and interchangeability of various types of repair actions and establishing, on their basis, an optimal strategy for carrying out all types of repair work. This means that when using it, it is assumed that objectively existing quantitative relationships between the volumes of each type of repair action and the service life of the main structural parts or elements of the bridge are known. Article 9 considers the issue of improving strategic planning and management of repair and reconstruction of road bridges. The study 10 concludes: "Based on the timing of bridge repairs and reconstruction, as well as an analysis of statistical materials on the state of bridges in the region, it shows that at present, despite the constant growth of the category of highways and the capital of highway bridges, the level of their transport and operational condition is very low. A number of road bridges and

overpasses need repair, and some are completely abandoned, the task has been set to conduct an inventory of all bridges, develop a targeted program for their repair and restoration.” The article also covers economic and mathematical modeling of the timing of bridge repairs and reconstruction. The authors of the article 11 propose a method for optimizing the implementation of medium-term repairs of highway bridges.] The scientific study [12 covers the issues of planning and managing the repairs and reconstruction of road bridges, as well as the development of an economic and mathematical model for optimizing the service life between repairs. The article 13 examines the development of a mathematical model for forecasting the volume of financing for the development of the road network. A mathematical model of road fund revenues is proposed, as well as a method for distributing road fund funds allocated for the development of the public road network of regions. The scientific work 14 covers the results of scientific research aimed at training and improving the skills of road specialists, improving the level of technical and operational qualities of roads, based on the creation of an electronic database of the technical and operational condition of roads and the development of automated software linked to a geographic information system. The following article 15 analyzes the effectiveness of the synergetic approach in management (to management) from a scientific point of view. Work 16 is devoted to systems

analysis in optimizing the service life between repairs of roads and bridges. The article 17 considers the development of a mathematical model for optimizing the service life between repairs of bridges. A criterion for solving this problem in a formalized form, as well as a mathematical model for optimizing the service life between repairs of bridges, are proposed. The study 18 considers the development of a method for calculating losses from untimely execution of current repairs of bridges. A procedure for solving this problem in a formalized form is proposed. Despite the relevance of the scientific studies considered above, these works do not sufficiently cover the business processes of planning and managing the repair, reconstruction of highways and bridges.]

METHODOLOGY

- ✓ This article is the first attempt to systematize the fundamentals of business processes in the management of repairs, reconstruction of roads and bridges. The methodology for developing the theoretical foundations of business processes for planning and managing the repair, reconstruction of roads and bridges is presented in two interrelated sections:
- ✓ 1. The main business processes in planning and managing the repair and reconstruction of roads and bridges.

- ✓ 2. The methodology for organizing business processes in the road industry using the classification of the main elements of the systems approach to planning and managing the repair, reconstruction of roads and bridges
- ✓ The main business processes in planning and managing the repair and reconstruction of roads and bridges are a set of activities aimed at coordinating all stages of work, from analyzing the condition of objects to completing repair and reconstruction work. These processes help ensure efficiency, transparency and high quality of work.
- ✓ The main business processes in planning and managing the repair, reconstruction of roads and bridges consist of the following processes:
 - ✓ 1. Analysis and assessment of the condition of the infrastructure
 - ✓ Monitoring and inspection: Regularly inspecting the condition of roads, bridges, tunnels and other structures using sensors, drones and visual inspections.
 - ✓ Data collection and processing: Collecting data on the condition of objects, including the level of deterioration, the number of accidents and traffic intensity, for the purpose of analysis and decision-making.
 - ✓ Prioritization of objects for repair and reconstruction: Identifying areas that require priority attention based on the degree of deterioration, accident rate and significance for the transport network.
- ✓ 2. Planning the repair and reconstruction of roads and bridges
 - Developing strategy and goals: Defining the main goals of the reconstruction or repair - improving safety, throughput, reducing operating costs.
 - ✓ Creating long-term and short-term plans: Planning all stages of the project, including site selection, resource allocation and development of work schedules.
 - ✓ Budgeting: Estimating the cost of all activities, including the purchase of materials, equipment rental, labor and possible unforeseen expenses.
 - ✓ Developing project documentation: Creating detailed designs, including drawings, specifications and coordinating technical conditions with regulatory authorities.
- ✓ 3. Organizing and distributing resources
 - ✓ Purchasing materials and equipment: Conducting tenders and purchases for the acquisition of high-quality materials and specialized equipment.
 - ✓ Contractor management: Selecting contractors based on their experience, quality of service and price offers, as well as concluding contracts.
 - ✓ Providing construction equipment and labor resources: Planning the distribution of construction equipment and workers, taking into account the timing and characteristics of each stage.
- ✓ 4. Work Progress Monitoring and Management

- ✓ Work Execution Monitoring: Regularly monitoring all stages of work execution based on established standards and deadlines.
- ✓ Interdepartmental and Contractor Coordination: Ensuring effective communication between all project participants to prevent downtime and errors.
- ✓ Quality Management Systems: Checking the quality of materials, pavement laying accuracy and compliance with technical standards using quality standards.
- ✓ Risk Management: Assessing and minimizing potential risks such as weather conditions, material shortages or delays using contingency plans.
- ✓ 5. Project Closure and Evaluation
- ✓ Final Inspection: Conducting a final inspection after completion of all work to assess whether the repair or reconstruction work performed complies with established standards and design documentation.
- ✓ Commissioning: Formal acceptance of completed work by the commission and commissioning of the repaired road sections or structures.
- ✓ Reporting: Prepare reports on costs, timeliness, and quality of work, and evaluate their effectiveness.
- ✓ Analysis and Lessons Learned: Assess project successes and failures, analyze mistakes, and gather information to improve business processes in the future.
- In addition, the following supporting processes must be taken into account:

1. Budgeting and financial control
 - Budget management and allocation, cost monitoring and resource optimization to minimize financial risks.
 2. Quality management
 - Ensuring compliance with all norms and standards at each stage of work to maintain a high level of safety and durability of facilities.
 3. Innovations and implementation of new technologies
 - Use of modern technologies, such as geographic information systems and road condition monitoring systems, to improve the efficiency and transparency of all processes.
 4. Communications and information support
 - Ensuring timely information on the progress of work and plans, interaction with the public and involving the population in assessing infrastructure needs.
- It should be noted that the use of a systems approach to business processes has the following advantages:
- Efficient use of resources: Clear planning and resource allocation can reduce costs and speed up the execution of work.
 - Risk reduction: Simplified coordination between participants, quality control and risk management reduce the likelihood of errors and accidents.

Transparency and quality control: Systematic control at all stages improves the quality of work and ensures compliance with standards.

Increased user satisfaction: Prompt response to public needs and efficient use of resources make roads and structures safer and more durable.

The above processes help optimize road repair and reconstruction work and ensure sustainable results in project implementation.

As a methodology for organizing business processes in the road industry, we use the classification of the main elements of the system approach to planning and managing the repair, reconstruction of roads and bridges.

A system approach to managing the repair and reconstruction of roads and bridges includes a comprehensive consideration of all elements and stages of this process. This approach allows you to create an effective and sustainable management system that covers both planning and implementation of work. It involves organizing and coordinating all processes based on interrelated elements that affect the quality, timing and costs of work. This approach helps to achieve more sustainable and long-lasting results, reducing overall costs and increasing efficiency. In our opinion, a systems approach to managing the repair and reconstruction of roads and bridges can be reduced to the following six main aspects:

1. Comprehensive planning, which covers:

Analysis of the current condition: Assessment of the condition of the road network and bridges (bridges, tunnels, etc.) through monitoring and regular inspections. Sensors and technologies are used to analyze defects and wear.

Prioritization of objects: Determining priorities for repair and reconstruction based on road condition, traffic volume, economic importance and accident risk.

Drawing up multi-year plans: Including all necessary activities in long-term programs taking into account the budget, technical standards and the strategy for the development of the transport network.

2. Use of modern technologies and data

Road asset management systems (AMS): Use of information systems for monitoring the condition of roads and structures. These systems allow you to control wear, plan repairs, assess risks and optimize resources.

Innovative repair technologies: Use of new materials and technologies such as self-healing asphalt, polymer coatings and durable composites that extend the service life of road surfaces and bridges.

3. Quality Assessment and Control

Standardization of Processes: Establish standards for every stage of the project, from design to completion. This includes material standards, paving methods, and quality control systems.

Regular Auditing and Inspection: Conduct independent checks and audits at key points in the project to ensure standards are met and avoid the cost of correcting errors.

Use of KPIs (Key Performance Indicators): Monitor key performance indicators such as pavement life, operating costs, completion times, and accident rates to assess the effectiveness of the management system.

4. Flexibility and Adaptation of the Plan

Modeling and Forecasting: Use data to model possible scenarios, such as road deterioration as traffic increases, allowing plans to be adapted to future conditions.

Adaptation to Change: A systems approach allows priorities, resources, and schedules to be adjusted as economic conditions change or more efficient technologies become available.

5. Environmental and Social Aspects

Minimizing Environmental Impact: The systems approach includes the use of environmentally friendly materials, recycled resources and technologies that reduce CO₂ emissions and other pollutants.

Ensuring Safety and User Convenience: Considerations are given to safety, reducing downtime, minimizing noise pollution and developing detour routes to reduce inconvenience to drivers and pedestrians.

6. Budgeting and Cost Efficiency

Cost Optimization: The systems approach reduces long-term operating and maintenance costs by using more durable materials and technologies, which reduces the need for frequent repairs.

Public-Private Partnerships (PPP): Attracting private investment to implement large projects, which allows for cost sharing and faster project execution.

RESULTS, ANALYSIS AND CONCLUSIONS

Organization of business processes based on a systems approach to the management of repairs, reconstruction of roads and bridges has the following advantages:

Firstly, it ensures increased durability and safety of roads and bridges. By using high-quality materials, regular monitoring and scheduled repairs, the system ensures a longer service life of the road surface and structures.

Secondly, it saves resources in the road industry. Cost optimization due to long-term planning and prevention of emergency situations.

Thirdly, the time for repair of roads and bridges is reduced. Thanks to accurate planning and prioritization, repairs can be carried out quickly and with minimal inconvenience to users.

Fourthly, the systems approach ensures effective management of the road industry, especially in conditions of limited resources and increasing traffic loads.

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