

IMPROVING THE EFFICIENCY OF ROAD TRANSPORT ENTERPRISE THROUGH THE USE OF INTELLIGENT TRANSPORT SYSTEMS

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Annotation: *In the article In the management of competitive potential, the interrelated components of the expansion of production capacity, the development of new areas of activity, the improvement of the institutional and legal framework, as well as the formation of additional labor resources strategy were considered. Due to the complexity and content of the assessment of the effectiveness of management activities in the transport system, a methodological approach based on minimum transport standards in improving the level of management of competitiveness has been improved. The possibilities of using outsourcing to increase the competitiveness of the enterprise in modern conditions were studied, and based on the analysis of forms and methods of using outsourcing in the logistics system in international practice, the possible areas of outsourcing in road transport services were substantiated. Systematization of the advantages and disadvantages of its use in the system of road transport on the basis of the analysis of factors motivating the use of outsourcing in the provision of transport and logistics services.*

Keywords: *competition, capacity, management, road transport, logistics, outsourcing, competitiveness, intelligent transportation systems.*

The formation of a long-term concept of ensuring the competitiveness of modern transport, of course, required an innovative approach based on the advanced achievements of science and technology. At the same time, specific progressive scientific research, practical developments or achievements in other areas related to the organization of transport activities can form the basis of innovation.

One of the modern opportunities in the formation of a long-term concept for the development of transport is the introduction of intelligent transport systems, on the basis of which we must apply the important principles of ensuring a competitive advantage in the industry.

1. The development of an innovative concept of long-term competitiveness should be based not on an inductive approach that includes improving existing technologies, but on a systematic approach that incorporates new ideas based on the future development of science and technology.

2. In the context of limited financial resources, this concept should be given priority over intensive development, rather than extensive development of transport. This will increase the possibility of more efficient use of available resources without significant additional costs.

3. Innovative ways to ensure a competitive advantage should be based primarily on the idea of striving for leadership for any transport operator. Therefore, it is necessary to rely on the advanced achievements of science and technology in the development of innovative ways of transport development.

4. The fastest growing innovative field in recent decades is information and communication technologies, which are the basis for the radical development of all these areas. Today, information and communication in the field of national road transport technologies achievements have not been achieved at the required level of applied work. This is because in the developed countries of the world, "Intelligent Transport Systems" (ITT) based on information and communication technologies have been widely used since the late 90s and 2000s. ITT is a decisive factor in the development of modern transport networks, combining the latest achievements of high technology, space and aviation technologies.

The importance of intelligent transport systems as the main idea of the concept of innovative development of transport is that in densely populated areas, large cities and megacities, the capacity of roads is much lower than the technical capabilities of vehicles. For example, the average speed in New York is 33 km per hour; Minsk - 17 km / h; In Moscow - 13 km / h, and in Tashkent - 20-23 km / h. Of course, at the same time as the opportunities to expand roads and build road crossings to improve transportation are limited in large cities, and their construction requires a huge investment. Therefore, the main efforts are focused not only on improving the performance of vehicles, but also on improving the management systems of transport processes.

The direction of ITT development is to create a single information space that unites vehicles, road equipment and traffic control centers across the country. Today, ITT is widely used not only in road transport, but also in rail and other modes of transport . There are two main purposes for applying ITT:

- increasing the speed of vehicles;
- Ensuring road safety.

In many countries, the use of smart management contributes to the modern technical development of society, the level of technology and the qualitative development of transport systems. The first generations of ITT focused on automated management ⁱ, information management, ⁱⁱand situation management ⁱⁱⁱ. Modern intellectual management is a scientific field that combines a number of scientific disciplines: mathematics, logic and system analysis, theory of transport systems, geoinformatics, navigation, etc.

based primarily on the integration of means of automation of transport control and management, information and communication technologies, dynamic geospatial information and a single information environment in the transport infrastructure, safety and efficiency .

Analyzes show that the rapid growth of the road fleet has led to a decrease in traffic speeds in this mode of transport to 30-40 km / h, which in turn has a negative impact on

transport and environmental safety. To overcome these problems, the introduction of intelligent transport systems in the process of traffic management in large settlements will reduce the level of congestion on the roads and increase their mobility, the possibility of rational use of road transport. A promising area of ITT use is the use of a global navigation satellite system to determine the location of these vehicles in real time. ITT significantly reduces operating costs and delivery time in freight and passenger transportation .

It is known that the problem of traffic jams on the road network is growing every year, as well as damage to the road surface, the environment and the conflict in the transport networks of major cities. In the context of continuous development of road networks, improving the quality of road transport services and the transition to a new level of information, transport, it is necessary to solve problems using modern tools and approaches, taking into account economic, social and environmental indicators ^{iv}.

It is well known that regulated intersections in major cities are a source of increased transportation costs. Queues appear at such intersections, which waste time and lead to frequent emergencies. Since transportation costs are an important social problem of economic and environmental importance, solving the task of reducing them is of great scientific and economic importance.

The current state of the road network in large settlements, especially the city streets, does not correspond to the growing number of vehicles. Based on the results of our research, we can list several ways to overcome this situation:

- Reconstruction and reconstruction of road networks in major cities;
- Prohibition of traffic for certain categories of transport in cities, especially on busy roads;
- optimization of the existing traffic management system.

While the first method requires work with very large capital expenditures , long-term construction work also leads to a deterioration in the state of transport supply .

The second method helps to clear some intersections and road sections, but it does not solve the problem radically, as the risk of congestion in other parts of the road network increases.

In the third method, the optimization of existing freight and passenger flow management systems allows for the most effective management of road traffic in real time, taking into account the situation in the managed area of the road network.

ITT can create a mutually coordinated environment for the management of freight and passenger traffic through the road transport infrastructure with information and communication technologies of the single transport system.

solved with the help of information and communication technologies:

- increasing the mobility of the population , management of passenger and cargo transportation (by collecting, transmitting, processing and receiving information about the process of movement);

Establishment of operational links in global transport systems (based on a quantitative assessment of the results of practical monitoring of traffic flows);

- quality control of transport services (characterized by indicators such as fuel consumption , safety, efficiency and environmental impact) ;
automatic control system to meet the growing demand for the transportation of goods and passengers by all means of transport ;
- optimization of logistics in transport;
- improve traffic safety.

IT T is an intelligent system that uses innovative developments in modeling transport systems and regulating traffic flows , providing more information to customers and ensuring transportation safety , as well as coordinating the interactions of different modes of transport in the transport services market .

The essence of the development of ITT is based, in particular, on expanding the opportunities for drivers and passengers to obtain reliable transport information about the current state of transport processes through the interaction of transport and management systems with road infrastructure. Based on the data obtained, road users will be able to quickly make the right decisions on the management of transport processes, which will improve transport and environmental safety and save transportation costs.

an urban setting, not only do large measurements need to be made to control traffic, but additional effects in traffic management, such as the geometric features of the streets, must also be taken into account in relation to the architectural development of the city. In this case, congestion can occur due to the disproportionate distribution of freight and passenger flows, so it is necessary to have information on changes in the characteristics of traffic flows on the relevant hauls, including those equipped with technical means of transport control.

The main difficulty in making observations is the high cost of existing complexes or the low accuracy of the use of meters and the high time spent. Modern universal computing and storage tools allow you to measure the flow of moving content with minimal use of human resources and investment ^v.

One of the promising areas of ITT use is the use of the Global Satellite Navigation Satellite System (GLONASS) to determine the location of vehicles at any place and time. However, at present, GLONASS does not provide sufficient accuracy to determine the location of vehicles, which limits the ability to use ITT in real time. In addition, GLONASS capabilities are limited in the context of transport tunnels and multi-storey urban buildings. To meet these requirements, it is necessary to integrate location detection technologies with wireless technologies to create a continuous virtual transport management environment in all conditions ^{vi}.

The following functional subsystems can be included in the ITT to increase the safety of freight and passenger transport:

- Tracking systems for vehicles on the route;
- systems for analyzing the distribution of freight and passenger flows along the routes;
- The presence of rolling stock in passengers, a system of warning about the time of arrival at the stop address ;

Video monitoring systems of the situation in the car interior;

- Automatic analysis of the speed of traffic on the sections of the road network, etc.

ITT's in motor transport development, of course, in freight and passenger transportation operations costs noticeable degree reduces. Large in megacities artificial satellite systems based on ITT and effective use time to be on the road noticeable degree shorten take is coming. This can also be achieved by installing flexible traffic lights at intersections where the intensity of traffic in perpendicular directions varies significantly during the day^{vii}.

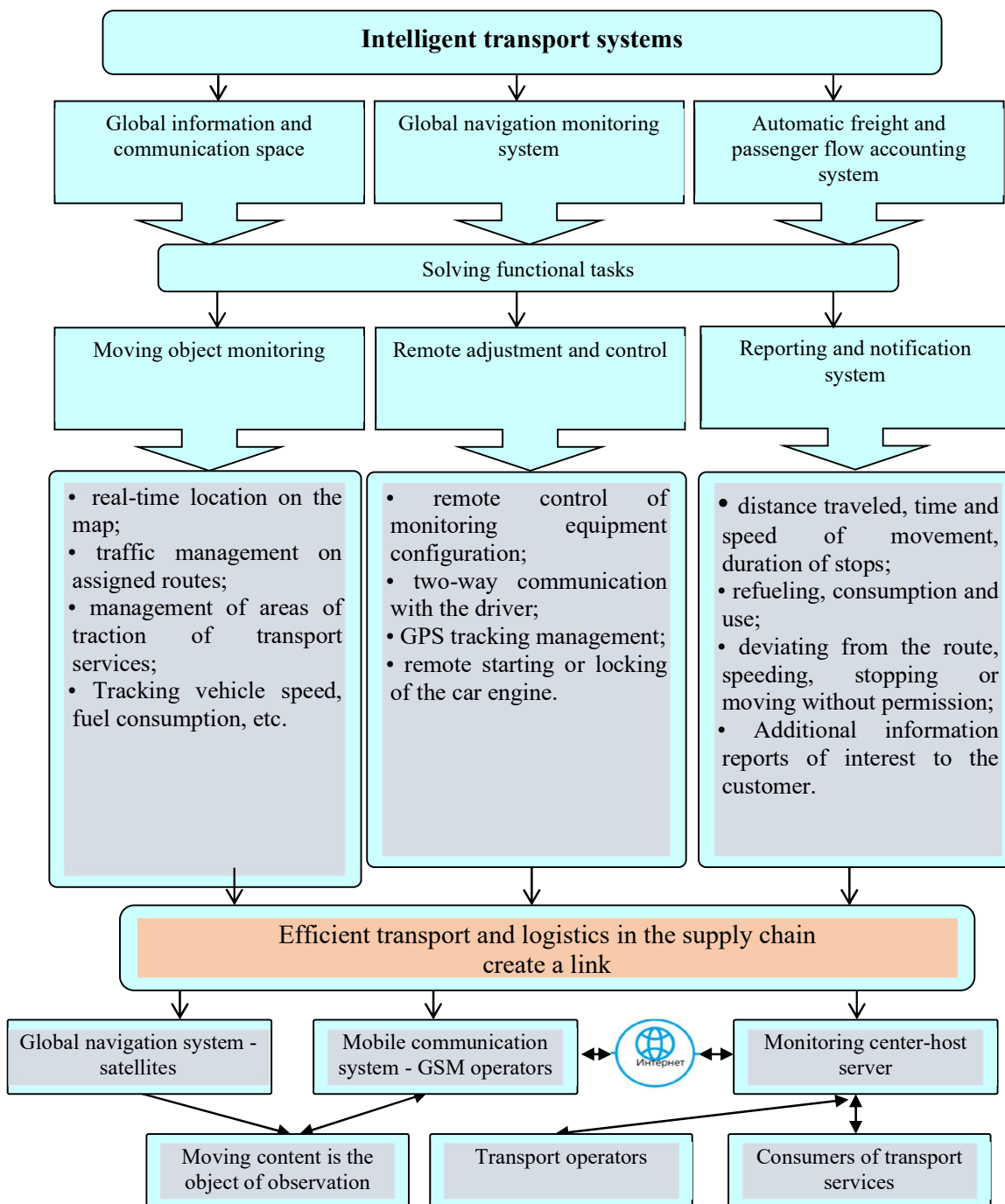
The ability to quickly change traffic speeds in some areas and notify drivers in a timely manner will help increase traffic and environmental safety. The positive aspects of the introduction of ITT in transport include the ability to provide emergency medical care in the event of a traffic accident that results in serious consequences, associated with appropriate emergency medical care, traffic safety, fire safety and other services.

ITT-based transport management is characterized by the ability to obtain rapid solutions in a short period of time, and can be considered as a means of overcoming information barriers caused by complexity on the one hand, and a large-scale data processing and analysis system on the other. The information systems and automated management process simplifies the initial data collection and delivers it for final use by the intelligent system.

Ensuring the balance and stability of the national economy, increasing its industrial share, reducing the resource capacity of the economy, the widespread introduction of energy-saving technologies in production, increasing labor productivity in the economy; maintaining stable macroeconomic balance based on the implementation of adopted programs, ensuring stable high rates of GDP growth through deepening structural and institutional reforms. ITT-based management not only facilitates the collection of initial data, but in some cases they solve complex problems in a short period of time that cannot be solved by humans. ITT not only facilitates human labor, but also makes wise decisions instead.

Based on the above considerations, it is possible to formulate the goals and objectives of creating a reliable supply chain system for the transport system on the basis of ITT, as well as the mechanism of their interaction (Figure 1).

Thus, ITT, as a means of overcoming information barriers, has made it possible to obtain results that many human and mechanical systems cannot. Within the framework of general innovative projects, the introduction of information and communication technologies in the system of road transport management can be achieved through the active use of important elements of the modern intelligent transport system.



mechanism for forming a reliable system of the chain^{viii}

One such modern solution is a satellite traffic monitoring system. Equipped with UZGPS / GLONASS monitoring, it allows to determine the location of the object, to obtain information about their movement, to control fuel consumption, as well as to identify stops and off-road use cases.

The effectiveness of the application of ITT is determined by the ability to save the amount of labor, time, resources and resources per unit of efficiency of technical systems and structures associated with its creation.

The benefits of using ITT are reflected in the following:

- a) in the volume of transportation (increase in volume and quality of transportation, growth in the range of transport services);
- b) technological (growth of labor productivity and improvement of working conditions);
- c) functional (increased management efficiency);
- g) social (improvement of living standards through the use of innovations).

Competitive advantages are achieved through the use of ITT through the intensive development of the transport enterprise, increasing the efficiency of resource use and ensuring the competitiveness of transport services.

The methodological assessment of the social effectiveness of ITT is more complex, it understands the results that help to meet the needs of man and society, usually without value (improving health, reducing the number of road accidents, meeting environmental requirements, etc.). They are often not directly or indirectly measurable, limited by quality indicators. In general, the greater the social achievement, the more difficult it is to give it an integral quality assessment.

Economic efficiency, a quantitative indicator of the type of resource, reflects the total amount of resources used and the full magnitude of the economic result obtained from the application of ITT. In this case, changes in traffic volume, revenue and expenses can serve as a description.

It is known that the volume of transport work (R) is determined by the transport of a certain amount of cargo or passengers over a certain distance. Its unit for freight transport is measured in ton-kilometers, for passenger transport - in passenger kilometers, for taxis - in paid kilometers, for part-time transport - in auto hours or moto hours.

At the same time, transportation costs are also determined by the cost per unit of transport work. The costs incurred in moving the vehicles are mainly operating costs and are estimated as variable costs in the cost of transportation (C_{own}).

Therefore, the use of ITTs in the management of transport processes can be manifested mainly in two cases:

- to increase the distance utilization coefficient, reducing the idle (unloaded, passenger) traffic of cars without changing the total distance covered;

- Simultaneously with the increase in the total distance covered, the idle (unloaded, passenger-free) travel of cars decreases, which serves to increase the distance utilization factor.

At a time when modern technology and innovative solutions to problems are offered, maintaining the competitiveness and profitability of the transport logistics services market will ensure the balance of the company. Improving the efficiency of value-added processes, as in manufacturing logistics, and outsourcing non-value-added processes are yielding good results.

Table 3.4

Annual economic benefit from the use of ITT, thousand soums

№	Indicator name	Unit of measurement	Calculation formula (determined by the number of rows)	Quantity		Difference, +/-
				In practice	When ITT is introduced	
1	2	3	4	5	6	7
1.	Number of cars	things		30	30	0
2.	Park utilization rate	-		0.9	0.9	0
3.	Daily mileage of cars	km		250	250	0
4.	The annual mileage of each vehicle	thousand km	$1 \times 2 \times 300/1000$	2025.0	2025.0	0
5.	Distance utilization factor	-		0.8	0.9	+0.1
6.	Annual payment miles	full km	4×5	1620.0	1822.5	+202.5
7.	Operating costs for a distance of 1000 km	thousand soums		510.0	510.0	0
8.	Cost of 1000 full km	thousand soums	$7 \times 7/6$	637.5	566.7	-70.8
10.	Annual shipping costs	thousand soums	$1822.5 - 1620.0) \times 70.8 = 14337.0$			
11.	Additional net income	thousand soums	$202.5 * 162 = 32805.0$			
12.	Total annual economic efficiency	thousand soums	$14337.0 + 32805.0 = 47142.0$			

The process of organizing transportation itself is a separate technological process, and organizations engaged in production have an effective economic relationship with transport operators through ITT.

According to research and observations, the integration of information technology in transport operations in our country is unsatisfactory. In the case of outdated national road fleets (75%), we recommend that the ITT be used as a basis to enable the efficient use of this available resource.

Based on the above, the economic benefits of applying ITT can be (I_{ITT}) calculated as follows.

$$I_{ITT} = (P^1 - P) \times (S_{uz}^1 - S_{uz}); \quad (3.10)$$

Here: P and P^1 - transport work before and after the application of ITT, tkm, road km, tol.km, auto hours, respectively;

S_{uz} and S_{uz}^1 - transportation cost before and after ITT application, UZS / tkm, UZS / road.km, tol.km, UZS / auto hours, UZS / moto hours, respectively.

Practical results of our research UZGPS "BePro Programmers Center" LLC in Tashkent in the activities of 30 passenger cars Nexia-3 using ITT elements, 47.1 mln. UZS per year. At the same time, operating costs per 1,000 km will be reduced by 70.8 thousand soums, which will allow the transport company to reduce transportation tariffs in the face of fierce competition.

Conclusion

In the management of competitive potential, first of all, the interrelated components of the expansion of production capacity, development of new areas of activity, improvement of the institutional and legal framework, as well as the formation of a management strategy for additional labor resources, search and development of investment sources were considered. It was proposed to develop a mechanism for managing the competitiveness of the road transport enterprise at the current, tactical and strategic levels .

Due to the complexity and content of the assessment of the effectiveness of management activities in the transport system, a methodological approach based on minimum transport standards in improving the level of management of competitiveness has been improved. At the same time, the possibility of using the cost calculation methods was considered, and a model for evaluating the integrated performance of minimum transport standards was developed.

The possibilities of using outsourcing to increase the competitiveness of the enterprise in modern conditions were studied, and based on the analysis of forms and methods of using outsourcing in the logistics system in international practice, the possible areas of outsourcing in road transport services were substantiated. A method of implementing outsourced management decisions through an integrated assessment of its performance capabilities has been developed.

One of the most effective ways to identify an enterprise's competitiveness, strengths and weaknesses, find ways to improve its performance, analyze production opportunities, and at the same time use benchmarking to compare the relevant performance of competing enterprises.

The advantages and disadvantages of the use of outsourcing in the provision of transport and logistics services in the road transport system are systematized on the basis of the analysis of factors. In order to provide transport and logistics services in the volume, quality and price required by customers in road transport enterprises, a method of assessing the cost-effectiveness of management decisions related to the formation and implementation of outsourcing orders was proposed.

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