THE ECONOMIC FOUNDATIONS OF INTERACTION BETWEEN THE SUBJECTS OF THE RAILWAY TRANSPORT IN ORDER TO IMPROVE THE EFFICIENCY OF TRANSPORT COMPANY

In the context of instability of global economic processes, problems of the country's economic development the issue of increasing the efficiency of the subjects of economic relations remains topical.

Rail transport is the foundation of the modern economy. In this sense, it acts as an object of market relations, on the effective activity of which the functioning and development of all branches of the economy served by it, enterprises, their associations and complexes. Despite the significant contribution to the country's economy, railway transport is experiencing certain difficulties: until now, the problem of moral and physical wear and tear of its fixed assets. So, for example, in the automation, telemechanics and interlocking service related to the infrastructure complex of railway transport, more than 95 thousand points of electrical interlocking (74 %) are operated in excess of the standard period, more than 29 thousand kilometers of auto-blocking (47 %). The key characteristics of electrical and electronic devices, rails, turnouts, elements of the superstructure of the track and its individual elements, other technical means of infrastructure farms lag significantly behind foreign analogues. The slowdown in the rate of technical development of fixed assets of railway transport causes a decrease in their reliability, and the inconsistency of the quality parameters of transportation with the level of world standards and can reduce the competitiveness of railway transport in the transport market.

The efficiency and quality of transport services to customers, and, accordingly, competitiveness is largely determined by the quality of the transportation processes and the reliability of the operation of technical means.

Assessment of the impact of hardware failures on the most important performance indicators is a promising direction for optimizing the costs of railway transport, which makes it possible to develop and adopt measures to reduce unproductive costs when realization of both freight and passenger transportation. In this regard, the chosen direction of scientific research is relevant, which led to the setting of the goal and definition of the objectives of this monograph.

Various stakeholder groups are involved in the implementation of any business process of a transport company. They can be consumers, labor

resources, suppliers, representatives of government, public and commercial structures, owners (shareholders, founders). Achieving a balance of interests is a difficult task, but it is especially important in a competitive environment to fully and timely meet the needs of consumers of railway transport services. In this case the transport company should clearly understand those requirements that are seen as significant for the consumer, as well as draw parallels with the necessary quality parameters of internal production processes, to meet these requirements. The gap between the achieved quality indicators and the required ones should be, as far as possible, minimal in order to avoid the potential consumer turning to competitors and losing competitiveness.

A feature of the main functional (horizontal) processes in transport is the participation of various departments and services in the same process. This fact determines the complex mechanism of interaction and the definition of quality criteria for the main business processes, and also targeted responsibility for the fulfillment of quality indicators of the transportation process. To ensure the rational use of available resources and the establishment of effective links between transport departments, production relations between departments, as well as between the personnel of the organization, should be considered and built as a relationship between a consumer and a supplier. In this case, identification of the functional unit (or economy), which is directly carried out by one or another the production process within the framework of the relevant business process. Functional link of the company responsible for one or another production process within a specific business process, empowered, regulatory, labor and technical base, has the necessary tools to manage the production process, bears responsibility for the quality of the process not only to the end user, but also to "internal consumers", that is, related departments (services) on the basis of financial and cash flows. This approach allows you to build relationships based on the motivated striving of functional units for the most positive results of the work of the entire company. Let us present the functional relationship of the divisions of a transport company within the framework of the main business processes in the form of table 2.6.1 *(Melnikov, (2013))*.

The characteristic features of the implementation of production processes in railway transport leave an imprint on the mechanism of interaction between various structural divisions. A transport event that occurs in one of them can affect the functioning of other departments. In this regard, the growth of unproductive costs may also occur in related divisions.

Table 2.6.1

Identification of the functional unit responsible for production process, by the main types of activities of railway transport

Business process name	Manufacturing process	Functional unit responsible for the process
1	2	3
Freight transportation	Train service by locomotives and locomotive crews	Traction direction
	Formation of trains of various categories	Traffic Control Directorate
	Shunting work	Traffic Control Directorate; Traction direction
	Loading, unloading, sorting of goods	Management Directorate terminal and warehouse complex
Freight transportation	Repair of rolling stock	Subsidiaries for repair wagons; Traction Repair Directorate rolling stock
	Maintenance and repair infrastructure devices (paths, artificial structures, facilities automation and telemechanics, means electrification and power supply)	Infrastructure Directorate
	Processing of train information and registration of transportation documentation	Regional communication center
Providing infrastructure services	Routine maintenance and repair of tracks, artificial structures	Infrastructure Directorate
	Maintenance and repair of funds automation and telemechanics	
	Maintenance and repair of funds electrification and power supply	
Provision of locomotive traction services	Locomotive service train traffic	Traction direction
	Shunting work of locomotives	

Continuation of table 2.6.1

1	2	3
	Repair and maintenance locomotives	Subsidiaries for the repair of traction rolling stock; Locomotive Repair Directorate
Long-distance passenger transportation following	Service by locomotives of passenger trains	Traction direction
	Formation of passenger trains	passenger company
	Transportation and service of passengers	
	Maintenance and repair of infrastructure devices (tracks, artificial structures, automation and telemechanics, electrification and power supply)	Infrastructure Directorate
	Repair of rolling stock	Subsidiaries for the repair of rolling stock
	Processing and registration of the train documentation, information	Regional communication centers
Suburban passenger transportation	Transportation and service of passengers in suburban traffic	Suburban Passenger Service Directorate communication or joint stock companies in the suburban area passenger transportation
	Maintenance and repair of infrastructure devices (tracks, artificial structures, automation and telemechanics, electrification and power supply)	Infrastructure Directorate
	Repair of rolling stock	Subsidiaries for the repair of rolling stock; Suburban Passenger Service Directorate
	Processing and registration of the train documentation, information	Regional communication centers

The quality of the resources involved is an important competitive advantage, which helps not only to meet the customer's quality needs, but also to optimize the company's costs.

That is why, in modern economic conditions, high demands are made on the labor resources involved. Indeed, achieving high results in doing business, ensuring high quality processes and production efficiency is difficult without highly qualified and professionally competent personnel. This is due to the economic assessment of the labor resources used. Labor efficiency combines socio-economic factors activities of the organization. Labor productivity (P_T) can be calculated using the following formula *(Pasichnyk and Akilina, (2005))*:

$$P_T = \frac{O}{T} \tag{2.6.1}$$

where O – is the volume of products (services) for a certain period of time in natural, value or other measures;

T – labor costs (working time).

A generalizing indicator of labor productivity is productivity, and labor profitability characterizes the ratio of profit from a certain type of activity and the corresponding labor costs or total personnel costs. Consequently, while reducing personnel costs, economic efficiency will increase. However, such savings must be justified and not lead to an increase in other unproductive expenses. For example, insufficient funding for training and advanced training of personnel can lead to errors in production activities, an increase in rejects at work, a decrease in labor productivity, and, therefore, ultimately – to an increase in costs. Therefore, an important point is the preparation and development of the Company's human resources in order to eliminate the growth of non-productive costs from defects in work.

Carrying out measures to increase the level of personnel potential of the transport company will optimize the number of employees. The economic effect arising from the increase in labor productivity includes savings in the cost of remuneration of "ineffective" labor.

The authors proposed the following calculation of savings on the release of workers due to an increase in labor productivity *(Pasichnyk and Akilina, (2005)):*

$$E_n = N_n \cdot \left(12 \cdot ZP \cdot K_{CH} + \frac{Z_c}{P}\right) \tag{2.6.2}$$

N_n – the number of laid off workers due to the growth of labor productivity, people;

ZP – average monthly salary in a transport organization, UAH:

12 – number of months in a year;

K_{CH} – the coefficient of deductions for social needs;

Z_C – current costs of the transport organization for the maintenance of the social sphere, thous.

$\overline{P}$ – average number of employees in a transport organization for the reporting period, people.

The number of released workers due to the growth of labor productivity is calculated as follows *(Pasichnyk and Akilina, (2005)):*

$$N_n = \overline{P} - \overline{P}\frac{I_v}{I_n} \qquad (2.6.3)$$

where $\overline{P}$ is the average number of employees in the transport organization for the reporting period, people;

I_v – index of growth of production volumes;

I_n – labor productivity growth index (output per person).

The implementation of measures to improve production efficiency and labor productivity involves the development of professional potential employees of a transport company on the basis of an objective assessment of the effectiveness of personnel, establishing a clear relationship between the implementation of the technology of transportation work and economic efficiency, productive and profitable work.

When implementing this approach, the relationship between labor results and the quality of work of transport units is directly traced, i.e. high-quality labor processes contribute to the formation of high-quality characteristics of the work of the entire company.

Based on the above, in the work of the internal links of the company to ensure the "guaranteed quality" of transport production, it is desirable to comply with the following principles:

– continuous quality assurance of internal production processes;

– involvement of all parts of the transport company in the process of providing "Guaranteed quality level";

– organization of relationships between departments and farms as a relationship between a consumer and a supplier;

– staff motivation to work results;

– monitoring the quality level of transport production processes;

– analysis of deviations and timely diagnosis of problems;

– distribution of responsibility of specific employees, divisions and farms for the unsatisfactory level of quality of horizontal processes based on their economic assessment.

Reliable operation of technical means serves as a guarantor of the fulfillment of the obligations to carry out transportation undertaken by the Company. The assignment of quality indicators of the transportation process by functional participants will allow to form a mechanism of targeted responsibility divisions of farms for the results of their work, based on their economic interaction. To assess the effectiveness of the work of the relevant functional units, it is necessary to apply the principle of transition of quantitative parameters (the number of failures of technical funds) in the economic characteristics of quality (the amount of economic damage due to failures).

The actual direction of economic development in railway transport is the problem of mutual coordination of the theory of measurement and assessment of economic efficiency with the theory of measurement and economic assessment. product quality and work. Their integral quality is generally characterized by the totality of all production and technical, natural and cost indicators and is expressed by the ratio between the use value and the cost of production and work. Determination of the quantitative measure of this ratio is the most difficult, not yet solved completely the task. In particular, in relation to railway transport, the issues of economic assessment of safety require further elaboration. cargo, reliability and safety of transportation. Methodological issues of economic assessment of delivery times, uniformity and rhythm of movement of freight flows and other tasks need further development. In the last For decades, the problem of measuring and assessing the socio-economic efficiency of measures to improve the quality of railway transport processes is becoming especially important.

In order to further develop this direction, we will conduct study of the parameters of ensuring the quality of the transportation process as constituent factors of the problem of increasing the efficiency of industrial and economic activities of railway transport.

To understand the relationship between quality categories, let's build a hierarchy of quality parameters for a transport company, figure 2.6.1.

The first level represents the quality of the resources used by the transport company, which includes the quality characteristics of supplied and purchased spare parts, components, equipment, vehicles, mechanisms and machines. In addition, this can include the quality of incoming labor resources and the rationality of the distribution and spending of financial resources.

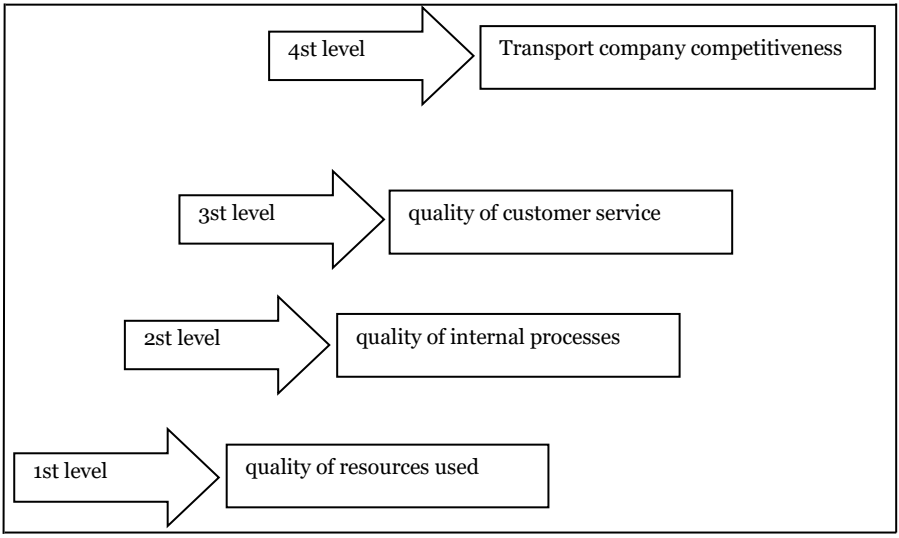

Fig. 2.6.1. Quality assurance system for transport products – transportation

The second level forms the quality of the implementation of the production processes necessary for the implementation of transportation, in particular, the observance of technology, the quality of the use of the existing material and technical base, the quality of the use of labor potential.

The third level is represented by the quality of service for cargo owners and the population. In the general case, here we can distinguish the level of satisfied demand, options for organizing transportation, taking into account the requirements of cargo owners, the complexity of transport services and others.

The fourth level characterizes the quality of the entire transport company, the level of its competitiveness. Here we can note such categories as the level of profitability, financial stability, market share, business reputation, investment attractiveness.

The corresponding business process is shaped by various production processes that are technologically interconnected. For example, the business process "freight transportation" cannot be implemented without such production processes as the operation of train and shunting locomotives, the operation of wagons, the repair of rolling stock, the current maintenance and repair of track devices, automation and

telemechanics, power supply, as well as communication facilities, processing and execution of relevant documentation and information.

To formalize the quality indicators of business processes, it is necessary to group the production processes that form them. Clustering of the main production processes by types of business processes is presented in table 2.6.2 *(Trushkina, (2019))*.

Table 2.6.2

Grouping of production processes by type of activity (business)

Type of activity (business)	Manufacturing process
1	2
Freight transportation	– maintenance of freight trains by locomotives – formation of freight trains of various categories – train work (direct transportation (moving) cargo) – shunting work – cargo handling – repair of rolling stock – current maintenance and repair of the track – routine maintenance and repair of automation equipment and telemechanics – routine maintenance and repair of electrification facilities and power supply – routine maintenance and repair of communication facilities – processing and execution of train documentation and information
Providing infrastructure services	– current maintenance and repair of tracks, artificial structures; – routine maintenance and repair of automation equipment and telemechanics; – routine maintenance and repair of electrification facilities and power supply.
Provision of locomotive traction services	– service by locomotives of train traffic; – shunting work of locomotives; – repair and maintenance of locomotives.
Long-distance passenger transportation	– service by locomotives of passenger traffic; – transportation of passengers; – shunting work; – repair of rolling stock; – current maintenance and repair of the track; – routine maintenance and repair of automation equipment and telemechanics;

Continuation of table 2.6.2

1	2
	– routine maintenance and repair of electrification facilities and power supply; – routine maintenance and repair of communication facilities; – passenger service at train stations on trains; – processing and execution of train documentation, information.
Suburban passenger transportation	– maintenance of trains by locomotives (locomotive traction); – transportation of passengers; – shunting work; – repair of rolling stock; – current maintenance and repair of the track; – routine maintenance and repair of automation equipment and telemechanics; – routine maintenance and repair of electrification facilities and power supply; – routine maintenance and repair of communication facilities; – passenger service at railway stations.
Repair of rolling stock	– repair of locomotives by traction type; – repair of wagons; – routine maintenance of rolling stock.
Construction and maintenance of infrastructure facilities	– the current maintenance of infrastructure facilities; – major and current repairs of infrastructure facilities; – construction of new infrastructure facilities under a contract construction contract; – reconstruction of infrastructure facilities; – installation and commissioning of facilities; Infrastructure.
Research and development work	– conducting scientific research; – implementation of experimental design and technological works, the result of which is a sample of a new product and design documentation for it, new technology.
Provision of social services	– maintenance, maintenance and repair of facilities housing and communal services, health and cultural purposes; – heat and power supply of housing and communal services facilities.

The main difference between the production process and the business process is that the implementation of the latter sets the goal not only to produce products that are of value to the consumer, but to obtain the maximum positive economic effect from this production. At the same time, the relationship between these categories determines the dependence of the quality of a business process on the quality of its constituent production processes.

It is the quality parameters of production processes that form the corresponding type of activity (business), determine the set of characteristics of the effectiveness of a particular business process, which is reflected in table 2.6.3 *(Rossolov, (2006))*.

Table 2.6.3

Indicators of the quality of the processes of the main activities (business) of the transport company

Code	Type of activity (business)	Process quality indicators
1	2	3
1	Freight transportation	1. The number of accidents, crashes, failures leading to violation of traffic safety; 2. Train-hours of train delays; 3. Deviation of the actual date of arrival of the goods from the date under contract; 4. The number of cases of theft or damage to cargo; 5. The ratio of the number of submitted and executed orders with an indication of the reasons for non-compliance; 6. Average value of relative deviations the executed schedule from the planned one; 7. Delay time of receipt of information, quantity discrepancies between received and actual information about cargo operations; 8. Precinct and technical speed of movement.
2	Providing infrastructure services	1. The number of kilometers of track with a speed limit; 2. The number of accidents, crashes, work defects, refusals technical means; 3. Train-hours of train delays due to the fault of the management infrastructure;

Continuation of table 2.6.3

1	2	3
		4. Aggregate Infrastructure Score = path score * specific weight of the indicator + score assessment of the power supply network * specific weight of the indicator + the number of failures of ZhAT devices * specific weight of the indicator.
3	Provision of locomotive traction services	1. Average daily mileage of a locomotive; 2. Train-hours of train delays; 3. The number of defects in work, failures of technical means; 4. The productivity of the locomotive; 5. Exceeding the norms of fuel and / or electricity consumption for traction of trains; 6. Unproductive loss of working time locomotive crews.
4	Long-distance passenger transportation	1. The number of accidents, crashes, technical failures means leading to violation of traffic safety trains; 2. Train-hours of delays of long-distance passenger trains followings; 3. Average value of relative deviations the executed schedule from the planned one; 4. The capacity of the passenger carriage.
5	Passenger Transportation in the suburban message	1. The number of accidents, crashes, technical failures means leading to violation of traffic safety trains; 2. Train-hours of commuter train delays; 3. Average value of relative deviations the executed schedule from the planned one; 4. Population of suburban composition.
6	Repair of mobile composition	1. The number of unscheduled repairs of locomotives; 2. Compliance with the standards of downtime in the repair of locomotives; 3. Number of car uncouplers due to malfunction; 4. Compliance with the standards of idle time of cars in the depot repair; 5. Average daily balance of faulty wagons.
7	Construction of facilities infrastructure	1. The volume of construction of infrastructure facilities;

Continuation of table 2.6.3

1	2	3
		2. Volumes of commissioning of constructed facilities infrastructure; 3. The number of deviations from standards and construction standards of standing infrastructure facilities.
8	Research and development work	1. Number of patents for scientific inventions, licenses; 2. The size of the R&D effect.
9	Provision of social services	1. The range of services provided in the social sphere; 2. The level of effective demand for social services spheres; 3. The size of the effect obtained as a result of the provision social services.

The state of infrastructure facilities has a significant impact on the execution of key business processes. The implementation of production processes based on the operation of infrastructure facilities is provided directly by the railway company itself, which increases its interest and responsibility for the proper fulfillment of its obligations under carrying out transportation by maintaining an appropriate level of quality the health and health of infrastructure devices.

The use of infrastructure facilities in accordance with technological and technical purpose, the permissible level of their wear and tear affect the quality transportation and act as a guarantor of ensuring the safety of train traffic.

It is important to know the consumer of a business process because it is he who explicitly or implicitly sets the requirements for the process and, therefore, can even influence the very fact of the existence of a particular process. The customer can be both external and internal to the organization. An external consumer is a consumer that is not included in the composition of this organization, and the internal one is the consumer who is within the framework of this organization.

It is generally accepted that five groups of stakeholders usually interact with an organization: consumers, suppliers, organization personnel, representatives of government, public and commercial structures, owners (shareholders, founders). Stakeholders in each case depends on the organizational and legal form of the organization.

If a malfunction occurs at any stage of operation, it must be eliminated as soon as possible either by the forces and means of the operating organization, or by joint efforts of the operating organization and

manufacturing enterprises regardless of the causes and culprits of its occurrence. Establishing the causes and culprits in the occurrence of a malfunction does not affect who should eliminate it, but the decision on who should be legally and financially responsible for its occurrence and the associated consequences, in particular, reimbursement of expenses for its elimination and non-admission henceforth. If a malfunction occurs during the warranty period, and the personnel did not violate the rules and operating conditions, then this responsibility rests with the manufacturer. If the malfunction occurred due to non-compliance by the personnel with the rules and / or operating conditions, then in this case the entire responsibility lies with the operating organization.

In any case, it is necessary to carry out the entire range of measures from the moment of detecting a malfunction to the final identification of its causes and preventing their recurrence in the future, called a complaint work. It should be noted that the term "reclamation work" is usually associated with the performance of such measures on the warranty product, i.e. on a product that has not expired. Therefore, the occurrence of a malfunction, especially on the product under warranty, requires solving many complex organizational and technical problems, such as: 1) timely and high-quality troubleshooting; 2) replenishment of the spare parts kits spent on the elimination of malfunctions; 3) research and elimination of the causes of malfunctions, increasing the reliability and availability of products; 4) increasing the responsibility of industrial enterprises for the quality of supplied products and operating organizations for strict compliance with requirements operational documentation and ensuring the high quality of their operation *(Kondrat'ev, (2010))*.

The consumer occupies a special place in the group of interacting parties. He purchases goods or services, providing the organization with the possibility of further functioning and development. Therefore, an indicator in the implementation of business processes while ensuring the proper quality is satisfaction consumer needs. Naturally, the gap between the actual performance indicators of cargo transportation and the required ones should be minimal, otherwise the consumer will turn his attention to the services of competitors.

According to the annual reports of Russian Railways, the main business process that generates the largest amount of revenue (about 80 %) is cargo transportation. Algorithm for assessing the efficiency of production processes in railway transport using the example of freight traffic will help to trace the interconnection of the relations of the subjects that arises during the implementation of the business process of cargo transportation (figure 2.6.2).

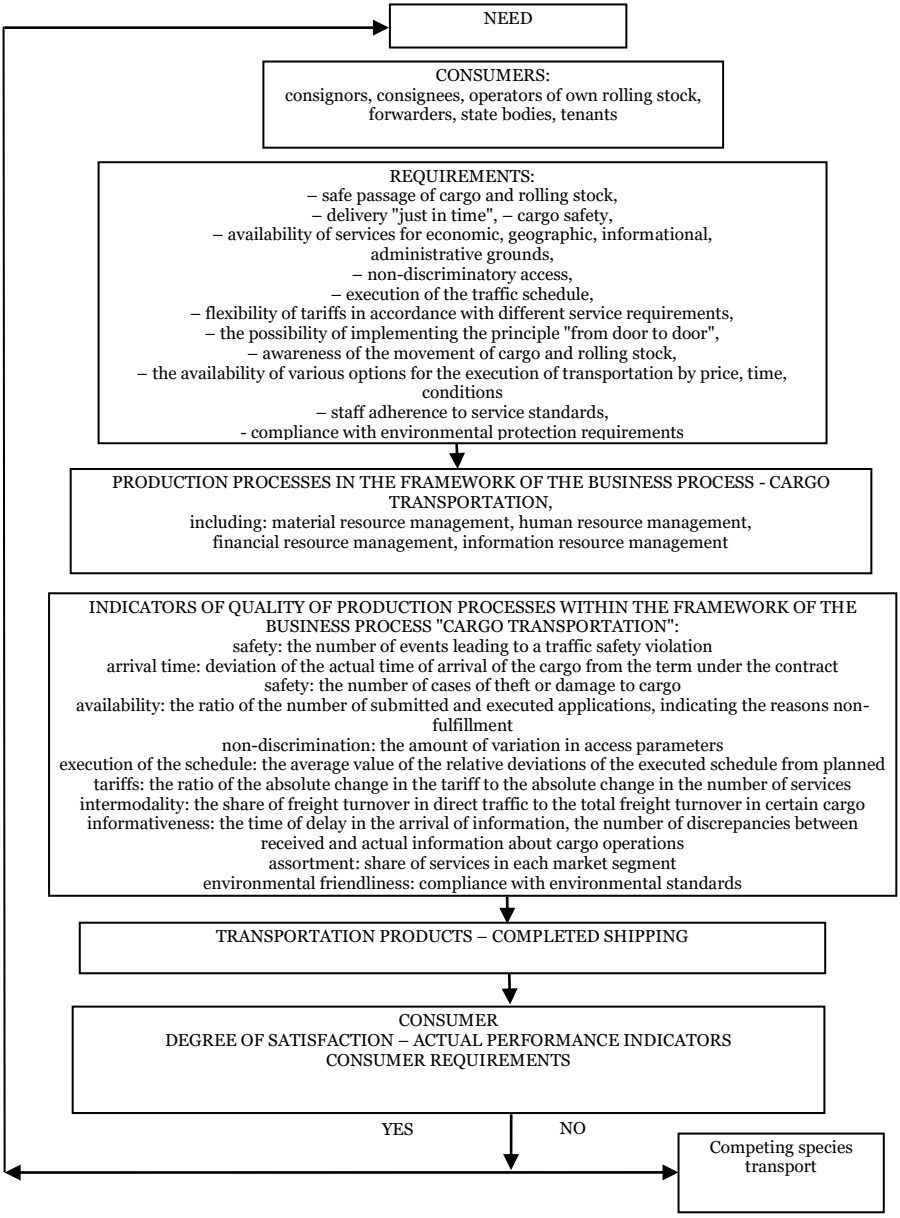

Fig. 2.6.2. Algorithm for assessing the efficiency of production processes

One of the factors affecting the importance of the efficiency and quality of production activities of the structural divisions of railway transport is the indicator of the reliability of the operation of technical means.

The state of reliability in the operation of the transport system guarantees the fulfillment of the obligations assumed by the carrier.

Some theoretical provisions in this area are presented from a technical point of view and from the standpoint of economics.

In relation to the transport complex, it is proposed to define reliability: "the reliability of the transport complex has the ability to provide timely and safe delivery of goods and passengers to their destination in given modes, conditions of use and maintenance" *(Trushkina, (2019))*.

The reliability of the transport complex depends, among other things, on the reliability of the equipment used for its maintenance. In the regulatory document, in the section: "Reliability in technology. Basic concepts. Terms and definitions "it is noted that" reliability is the property of an object to preserve in time within the established limits the values of all parameters characterizing the ability to perform the required functions in the specified modes and conditions of use, maintenance, repairs, storage and transportation " *(Shemayev, (2017))*.

The standards regulate the concepts that characterize the reliability products as follows:

Reliability – the property of a product to remain operational for a certain period of time or operating time.

Durability – the property of a product to maintain performance up to limit state with necessary breaks for technical service and repair.

Maintainability is the ability of a product to undergo repair while maintaining its functionality after maintenance and repairs.

The state of reliability, including in the implementation of transport production processes, is inextricably linked with failures of technical means.

Failures of technical means of railway transport serve as a factor affecting the reliability of the transport complex. The number of failures increases – the reliability of the transport decreases. Consider the main points related to the concept of failure.

The authors refer to a failure as an event in which an object goes into an inoperative or limit state. At the same time, in an inoperative state, the parameters of an object that characterize its ability to perform its own functional purpose, do not meet the requirements of the normative, technical and design documentation. The limiting state is called an object in which its further use for the intended purpose is unacceptable or

impractical, or the restoration of its serviceable or efficient state is impossible or impractical *(Melnikov, (2013))*.

Considering the above, this paper proposes the following concept of failure. A failure should be understood as an event consisting in a malfunction of a technical device, requiring the restoration or replacement of assembly units and parts or adjustment of their characteristics in the period between scheduled types of maintenance and repair, as well as if this restoration (replacement, adjustment) is not included in the scope compulsory works and, if the time or labor intensity required for their implementation exceeds the norms established for repair, in addition, such a malfunction of the technical device, in which it becomes necessary to completely replace it.

This definition reflects the signs of various categories of failures. For example, sudden, gradual, and intermittent failures are distinguished by nature. Accordingly, the first and second categories of failures are also given in another source, however, the authors do not distinguish intermittent failures *(Trushkina, (2019))*.

Sudden failures occur as a result of an abrupt change in the values of the object's parameters. A sudden failure is a random event. His difficult to predict and can only be expected with a certain degree of probability. Gradual failures occur as a result of a gradual change in the values of the parameters of an object as a result of its aging. Gradual failures can be predicted. An example of a gradual failure of a relay is contact failure as a result of their oxidation during long-term operation. Gradual failures are especially common in mechanical systems and are associated with fatigue of metals.

Intermittent failure is also called failure and identify it as a recurring self-eliminating refusal of the same nature. Failures are more common in complex electronic systems as a result of short-term effects of temperature changes, external electromagnetic influences, fluctuations in supply voltages on the parameters of highly sensitive electronic elements. Crashes have short-term action and can distort information that is processed in the appropriate system.

You can trace a close connection between the above classification of failures and the degree of deterioration in the quality of transport production processes. Since the degree of quality determines the level of use value of the products, that is, the ratio of price and quality that meets the requirements of the consumer, the more complex the failure, the higher the degree of quality reduction and the higher the costs of eliminating the failure, maintaining the quality "ordered" by the consumer.

There is another classification of failures. Depending on the stage of the life cycle of a technical object, in this case, not all stages are

reflected, however, structural, production and operational failures are distinguished.

Structural failures include failures resulting from imperfection in the design and design of the facility, production failures due to imperfect manufacturing technology, construction and installation of the facility, operational failures due to violation of rules and operating conditions of the facility *(Grinchenko, (2017))*.

Taking into account this classification, the transport company should pay more attention to working with suppliers in order to exclude a decrease in the quality of transport production processes and an increase in non-productive costs due to design and manufacturing failures. Responsibility for operational failures completely falls on the subject, carrying out transport and production processes, the influence of the "human factor" is increasing.

In accordance with the normative document "Safety of railway automatics and telemechanics. Terms and definitions "distinguish between two types of inoperative state: protective and dangerous *(Christopher, (2011))*.

A protective state is an inoperative state of the system, in which the values of all parameters characterizing its ability to perform the specified functions to ensure the safety of train traffic meet the requirements of the normative, technical and (or) design documentation.

A dangerous state is an inoperative state of the system, in which the value of at least one parameter characterizing its ability to perform specified functions to ensure the safety of train traffic, does not meet the requirements of the normative and technical and (or) design documentation.

By analogy with the above definitions, the author distinguishes dangerous and protective failures.

A defensive failure is an event involving a violation the operational state of the system while maintaining the protective state.

A dangerous failure is an event consisting in the disruption of an operable and protective states.

It is obvious that both with protective and dangerous failures, the quality of the transport and transportation process decreases, in particular, the quality parameter of the main business processes – traffic safety (transportation). However, there is no direct correlation between the occurrence of a failure, even a dangerous one, and the fact of an accident or a crash, since the production process is influenced, in addition to technical means, by others. factors, for example, production personnel, therefore, in terms of the quality of the transport and transportation process, the

concepts of failure, accident, crash, malfunction have conceptual distinctions and appear as separate indicators of the quality of the transport production process.

Failure can interrupt the transport production process, causing an unregulated technological break, which can occur both in the event of a dangerous and protective failure. Intermittent failure is generally not interrupts the production process, but may cause delays. An increase in the duration of the delivery of goods can be regarded as a failure to fulfill contractual obligations by the carrier (quality of service parameter), which will ultimately cause an increase in its costs: will lead to the need to pay fines, penalties, penalties.

As already noted above, the failure of the technical means of transport involved in the transportation process can cause an unregulated break, interrupting the transportation for a certain time. Taking into account the time factor and the severity of the consequences in accordance with the "Regulation on the procedure of official investigation and registration of traffic accidents and other events related to the violation of traffic safety rules and the operation of railway transport ", depending on the duration an interruption in the transport production process, three categories of failures are distinguished:

– the first category of failures includes failures that lead to a delay passenger or suburban train for 6 minutes or more; freight train on haul (station) for 1 hour or more or led to cases of violation traffic safety in train or shunting work;

– the second category includes failures that led to a train delay on the stretch (stations) lasting from 6 minutes to 1 hour or, when rendered the impact led to a deterioration in performance, excluding delays of trains belonging to the first category;

– the third category includes failures that do not have consequences related to failures of the first and second categories.

In the operation of the transport system, the state of reliability guarantees fulfillment of the obligations assumed by the carrier. In addition, the duration an interruption in the transportation process is in direct proportion to the growth costs, and these are non-productive costs. In order to maintain operability of technical means, performance of reliability parameters in first of all, technical systems are to be introduced in which there are devices that duplicate the failed ones. In most cases investment costs for such systems are higher, however, in the future they offset by the effect of cost savings.

The specific change in the failure rate of technical means is a criterion for the quality of the equipment, which belongs to the category of

production quality. Also referred to as production quality is the quality of operational work.

Production quality indicators are internal indicators of a transport company (rolling stock productivity, duration of various technological operations, etc.).

First of all, the transport company itself is interested in improving production quality, since at the same time it saves its costs. Consumers are interested in increasing it indirectly, since the high the quality of production processes leads to an increase in the reliability of railway transport and a more complete satisfaction of the demand for transportation.

From the point of view of the consumer, we can talk about the consumer quality, in the indicators of which he is interested. The transport company is interested in improving consumer quality only if it will cause an increase in demand for transportation.

Quality management in railway transport began precisely as production quality management. There were many reasons for this: the obviousness of the indicators, the relative simplicity of their calculation, the need to master the planned volumes of traffic with a limited amount of equipment, and finally, the obvious relationship between the improvement of these indicators with a decrease in the cost of transportation and investment requirements. Indeed, than the higher the productivity of one car, the less cars are needed to master a given volume of traffic. The shorter the turnaround time of the car (that is, the time of one of its production cycle), the more cycles the car will make, for example, in a year, and the less, again, you will need wagons. Likewise, the reduction in the empty run of the car (i.e., the unproductive part of the cycle) reduces the need for the car fleet. The increase in train weight reduces the need for locomotives and improves the utilization of the capacity of the railway lines.

The impetus for the development of the theory of consumer quality on railway transport was the transition of our country to a market economy, the emergence of competition between modes of transport to attract cargo owners.

A generally accepted system for assessing the quality of transport services has not yet been fully developed. Nevertheless, there are two main methods for assessing the quality of transport services:

– the method of natural assessment, when several indicators are linked by specific weights into a common complex indicator; the result of such an assessment is expressed in one number – a complex indicator of quality, measured by a relative value;

– quality valuation method involving analysis the ratio of the natural level of quality of transport services and the costs associated with its achievement, and including an assessment of the effectiveness of measures to improve the quality.

Taking into account the interconnection of indicators of internal and external quality in a competitive market, improving the quality of transport services is a tool for attracting customers, increasing the efficiency and competitiveness of a transport company and its products.

Therefore, the operation of the infrastructure complex of the transport company is the basis of efficient operation of the railway transport as a whole and affects the state of financial and economic stability of the transport company and the level of its competitiveness. Reliability of infrastructure work complex, flexibility of techniques and methods of management of all its links are necessary for effective adaptation of railway transport in the dynamically developing and highly competitive environment that defined direction of the present study.

In the course of the research the scientific task on improvement of approaches to economic estimation of efficiency of production activity of structural divisions of the infrastructure block of railway transport based on formation of a category "economic consequences of failures of technical means" is described.

Improving business processes in railway transport leads to increased production efficiency of the entire transport company. The offered methodological approach allows to estimate in the economic plan such qualitative parameter of work of an infrastructure complex of railway transport, as reliability of technical objects. All this leads to increased competitiveness of the transport complex and is relevant for practical use in transport enterprises.

Assessment of the impact of failures of technical means and marriages in performance and economic criteria for the operation of railway transport will allow to make objective management decisions in the field of renewal of fixed assets in order to improving traffic safety and implementing measures to reduce the share of unproductive costs of structural units of the transport company.

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