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Research Paper

Justification of the Annual Program of the Transport Company

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Abstract

The issues of optimising economic and labour costs take a significant place in the production activities of transport companies. They depend on the socio-economic situation, objective reasons of production nature, availability of appropriate material and technical bases, as well as effective use and competence of enterprise management. It seems relevant to establish a transport enterprise programme to increase operational efficiency. Therefore, research outlines the characteristics of the work programme (order portfolios) of car service stations in the current environment and focuses on ensuring their stability. Mathematical modelling and methods of mathematical and statistical analysis served as principal tools, although analysis, synthesis, comparison and other methodologies were also significant. Authors represent the car service stations production programme as the sum of failures and faults arriving at the enterprise in random order. The results of the experimental studies underwent analysis based on probability theory and mathematical statistics, where mathematical models of the annual programme and the probabilities of its distribution in a given time interval were obtained. The authors recommend measures to optimise the production programme by ensuring uniform loading of car service station structures. It can be studied numerous theoretical issues during the design phase of production sites and make accurate predictions. There are theoretical methodologies based on certain results, which are suitable for the design of road transport services. One of them is a calculation of the enterprise's annual program based on a grouping of the number of vehicles coming into the site. The work brings new regard to the shape of the programmes related to car service providers.

Keywords: Motorisation; Vehicles; Car service station; Poisson's law; Random processes; Regression equations

1. Introduction

The transport industry puts an important emphasis on the economic development of both the country and its businesses. A well-developed transport infrastructure in any geopolitical unit provides the basis for extensive economic activity: it facilitates the transportation of passengers and goods through logistics points, increasing economic opportunities and thus improving the standard of living in the country [1]. The same applies to business, where correctly organised logistics not only deliver all planned orders on time but also increase a company's competitive position and solidify its profits [2]. Therefore, ensuring uninterrupted operations for transport companies is a crucial task, not only for these service providers but also for other enterprises and the economy as a whole [3]. This makes it relevant to consider and find new techniques to increase their effectiveness. Thus, in this paper authors compared empirical data on failures with their theoretical values based on data from a functioning passenger car service station (CSS) in Aktobe. In addition, the authors described specific features of the formation of transport company programmes in modern settings.

A significant number of scholars have worked on this and related issues. Among them, it should be mentioned R.W. McQuaid, M. Greig, A. Smyth, and J. Cooper [3], who described many aspects of transport companies including their role in the economic prosperity of the country in an immersive body of work. In return, A.N. Semernin et al. [4] have worked on the annual programme of a transport company but used a different methodology for its formation, based on the wear and tear of vehicles. Although it would appear rather one-sided, it can be skilfully used with the one described in the paper, which will improve the efficiency of the annual programme creation. Similar methods for creating the annual methodology are featured in the works of O.S. Tamer et al. [5]. In their work, they examined empirical data from the Northern United Company to compile its annual programme. O.N. Yarkova and A.V. Trufanova [6] carried out another work using the described methodology for justifying the annual programme of a transport company, where the researchers also used data on vehicle wear and tear, annual mileage and transportation volume. However, it is worth noting that their methodology followed the pattern featured in the research. Nevertheless, owing to other key indicators, the principles described are free to use by companies in conjunction with other methods to achieve even greater efficiency in transport enterprises.

The production process of transport companies encompasses a series of interlinked stages that collectively ensure the efficient movement of goods, services, and people. Beginning with meticulous planning and scheduling, it moves on to vehicle preparation, loading and packaging, and dispatching with clear communication [1]. As vehicles transit along predetermined routes, continuous monitoring ensures progress and timely updates for customers. At the destination, unloading and distribution occur, supported by meticulous documentation and reporting to maintain accuracy.

The cycle continues with post-trip maintenance, guaranteeing vehicles are in optimal condition for subsequent journeys. This process is underpinned by a commitment to continuous improvement, guided by data analysis to enhance routes, reduce costs, and upgrade technology [3]–[5]. In essence, the production process of transport companies orchestrates a complex yet coordinated ballet, ensuring the seamless movement of goods and people while contributing to the functionality of economies and societies at large.

The study’s relevance rests in its comprehensive assessment of the transport industry's role in national development. Therefore, the purpose of the study is to explore the specifics of transport enterprises functioning (based on empirical data from Aktobe car service station) and to describe the methodology of annual programme formation of transport enterprises on their basis. The object of the study directly involves empirical data on enterprise activity in Aktobe.

2. Materials and Methods

The work examines specific features of the formation and implementation of the production program of the enterprise activity on the example of the operating car service station in Aktobe. The study features the results of field observation of the random request flow from enterprise customers concerning repair defects and failures of passenger cars during the calendar year. In the theory of technical operation, these phenomena refer to discrete random processes occurring in continuous time. In technical applications, these are Markovian random processes, which notably demonstrate that the probability of the objects being in a particular state does not depend on how and when the objects in question arrived at that state, but only on what state they are now. The statistical processing involved the elements of probability theory and mass service theory [7]–[9]. The objects of observation were the number of passenger cars, main assemblies and units coming to the enterprise for maintenance, repair and troubleshooting operations. Note that the above data build the nominal basis of the annual programme and the annual workload of the enterprise. There is also a theoretical part in addition to statistical and analytical components. This one describes the specific features of the creation of the annual programme of a transport company and indicates the role of transport enterprises in the functioning of other companies and the country's economy as a whole.

The research methodology employed in this study primarily centred around empirical methods, with a strong focus on statistical and mathematical analysis of datasets. The utilization of graphical representations, correlation and regression models, and the description of distribution functions using Poisson's law emerged as prominent techniques. These empirical methods facilitated a qualitative analysis of the data under examination, enabling a comparison with the theoretical prototype and yielding crucial insights for the research objectives. Complementary research methods also played a significant role in shaping the study's outcomes. Notably, the analysis method was of paramount importance, given the extensive amount of empirical statistical and theoretical data processed during the research. The application of synthesis, deduction, and abstraction further contributed to achieving the study's goals, enhancing the depth of understanding and interpretation of findings.

A noteworthy aspect of the methodology involved a comparative approach. This encompassed a comprehensive examination of methodologies used by other scholars for the formation of annual programs in transport companies. This comparison aimed to assess the distinct attributes of these methodologies about the approach detailed in this paper. By contrasting these methodologies, the study gained a broader perspective and a more nuanced understanding of the uniqueness and efficacy of the methodology proposed. In essence, the methodology was a holistic blend of empirical techniques, encompassing statistical and mathematical analyses, as well as complementary methods like analysis, synthesis, deduction, and abstraction. The incorporation of comparative analysis enriched the study's insights by contrasting various methodologies used in the field.

The entire writing process can be divided into several stages. The first step was to examine briefly the general background about the role of the transport system in business activities and its overall effect on the state economy. In the second stage, authors evaluated existing information on the number of incoming failures based on empirical data from the Aktobe enterprises with subsequent mathematical process and validation using the appropriate methods described in the methodology. The final step is to compare the results obtained during the study with data from other research papers. In particular, the authors have compared the individual methodologies of other scholars for creating an annual programme for a transport company.

3. Results

Let us take a brief look at the role of the transport industry in the functioning of the global economy. The transport industry occupies a certain place in the international economic system. For example, the share of transport in the world's gross domestic product (GDP) ranges from 6% to 15%, in Kazakhstan – 7-8%, Russia – 8.5% [10]–[12]. Each year more than 100 billion tonnes of freight and more than 1 trillion passengers use all kinds of transport worldwide. Globally, there is currently a trend towards an intensively increasing level of motorisation. According to official sources, there has been an annual intensive increase in the total number of vehicles and the level of motorisation. For example, the source states [13], that there are 947 million personal cars and 335 million commercial vehicles in operation worldwide in 2021, not counting heavy off-roaders and construction vehicles. As a result, the analysts found that there were 1.2 billion cars in the world at that time. Of the total number of registered vehicles, 95% were passenger cars. Note that this configuration of the vehicle fleet structure is typical for the Republic of Kazakhstan, where this indicator corresponds to 83.2% [14].

According to the United Nations Economic Commission for Europe [15], the level of motorisation in industrialised countries ranges from 600 to 1000 units per 1000 inhabitants in 2021. For individual countries the indicator is as follows: San Marino – 1263; Monaco – 899; Liechtenstein – 750; Iceland – 745; Luxembourg – 739; Italy – 679; Canada – 607; Cyprus – 532; Finland – 612; Kazakhstan – 219; Ukraine – 173 [16].

It is also important to consider the aspect of development in the field of operation in other countries. **Table 1** summarizes the experience and some characteristics of vehicle production and maintenance in different countries.

The level of motorisation is not only an indicator defining the degree of industrial development of countries but also puts forward an extensive array of organisational and technical measures related to the operation of the vehicle

Table 1. Vehicle manufacturing and technical operations experiences in different countries

Country	Experiences
Germany	Known for precision engineering, Germany has a rich history of producing high-quality vehicles and is home to renowned automotive brands. Technical operations emphasize innovation, performance, and safety.
Japan	Japan is celebrated for its efficient manufacturing processes, producing reliable and technologically advanced vehicles. Japanese automakers prioritize quality, fuel efficiency, and technological innovation.
United States	The United States has a long-standing automotive industry, with a focus on diverse vehicle types, such as trucks and SUVs. Technical operations emphasize innovation, scale, and customization for consumer preferences.
South Korea	South Korea's vehicle industry has rapidly expanded, known for producing economical and compact cars. Technical operations focus on automation, efficiency, and producing vehicles that balance affordability and quality.
China	China's automotive industry has grown significantly, producing a wide range of vehicles. Technical operations emphasize scale, efficiency, and electric vehicle (EV) technology advancement.
Italy	Italy has a reputation for luxury and sports car manufacturing. Technical operations prioritize craftsmanship, design, and high-performance engineering.
Sweden	Sweden is known for producing safe and innovative vehicles. Technical operations emphasize safety features, environmental sustainability, and cutting-edge engineering.
India	India has a growing automotive industry, with a focus on small cars and affordability. Technical operations prioritize cost-effectiveness, resource efficiency, and adapting to diverse market demands.

fleet in production conditions as well as the corresponding material and technical base. The specifics of the functioning and operation of a modern fleet of vehicles aimed at the maintenance of the existing fleet in a workable condition and ensuring the reliability and operational performance of vehicles to regulatory requirements have been sufficiently studied, systematised and presented in the relevant special literature [17]–[20].

Based on the research, authors obtained the statistical data of Aktobe enterprises on failures of main groups, units and assemblies as a whole, the sum of which authors examined as the enterprise's programme. The total number of incoming failures as a result of data processing is grouped and allocated with an account of existing production units and sites as well as technological compatibility of operations as follows: cleaning and washing – 3890; fuelling – 2385; diagnostics – 1567; repairs, maintenance – 7786; bodywork – 2637. Based on the data obtained, the experimental and theoretical distributions of failures as opposed to time are demonstrated in graphics in **Figure 1**.

Figure 1a shows, among other things, that the theoretical and experimental dependencies of the number of failures over time have very similar configurations. Therefore, it can be obtained a regression equation for the dependence of failures on time, which is approximated by a third-degree polynomial of the following Eq. (1).

The presented model appropriately describes the process under study with a correlation coefficient of R=0.9703 and a standard error equal to 55.56. The analysis of the results in this model shows the uneven distribution of failures over the study period, indicating a need for its optimisation. The model presented in Eq. (1) helps to determine and predict the process of change in the company's programme in a given interval of operation and characterises its irregularity. The authors obtained the values of the corresponding probabilities of time-dependent failure occurrence by the production sites based on mathematical processing of the statistical indicators according to the dynamics of changes in the number of failures. In recalculating the above data, authors obtained the failure probability distribution by types of work, as estimated by sites: for cleaning and washing – 0.21; for lubrication and filling – 0.13; for inspection and diagnostics – 0.09; for maintenance and repair – 0.43; for bodywork – 0.14. The same data are used to recalculate statistical measures of failure probabilities in a given time interval, such as working day, shift or hour. **Figure 1b** shows the probability distribution graph of the failure's occurrence of Pt for the time period under study T, where the latter is the months of the year.

The graph in **Figure 1b** shows the probability dependency of failure occurrence Pt and the time T, which is approximated by a polynomial of the following Eq. (2).

The obtained model appropriately describes a random process of a failure probability distribution of units and vehicle assemblies with a correlation coefficient R=0.9046 and standard error equal to 0.005, which indicates a high degree of result convergence in experimental and theoretical data. The analysis of this model shows an uneven distribution of failure probabilities over the calendar period, which should be taken into account when forming the annual programme of the enterprise to ensure uniformity of the loading of production areas. These activities depend primarily on quality management and marketing activities. The model presented in Eq. (2) helps to predict the process of change in enterprise load, depending on the chosen measurement interval. The dependencies presented by Eq. (1) and Eq. (2) showcase the results of summing up the number of failures Na as well as demonstrate the probability of failure occurrence Pt for calendar months of the year. They generally indicate the implementation of a random process without taking into account the probability characteristics of failures, featured within the considered structural components of the process, which is acceptable for technological groups. The latter is the subject of separate study and research.

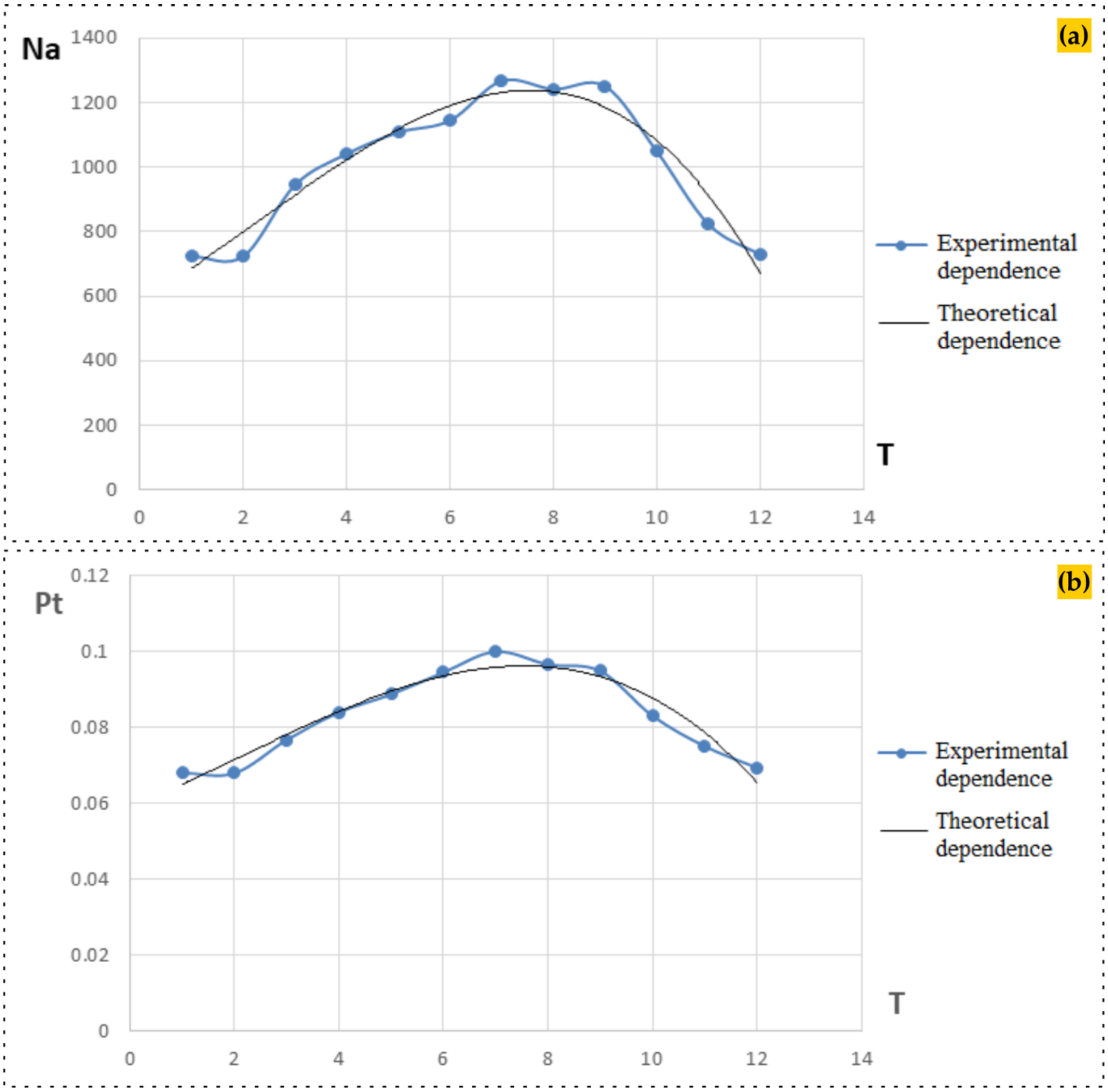

Figure 1. a) Failure Distribution Chart; accepted designations: Na – number of failures; T – time; b) Distribution of failure probabilities; accepted designations: Pt – is the probability of failure occurrence in time t; T is the time

$$Y = 1.4253x^3 + 10.05x^2 + 91.604x + 586.78 \tag{1}$$

$$Y = -7 \cdot\cdot 10^{-5} - 5x^3 + 0.0005x^2 + 0.0057x + 0.0589 \tag{2}$$

The considered failure processes represent the simplest failure streams meeting the requirements of the stationary state, ordinariness and no after-effects. According to M.J. Evans and J.S. Rosenthal [8], and K. Stapor [9], the flowing condition is also met when the occurrence probability of one event (failure) in an infinitesimal time interval is proportional to the length of this interval up to infinitesimal higher orders. In this case, the working time of one day is an infinitesimal amount of time, an interval equal to a calendar year. The failure probability functions for the main components and units of the listed systems are described by Poisson's law [7] in accordance with Eq. (3).

$$P_k(t) = \frac{(\omega t)^k}{k!} e^{-\omega t} \tag{3}$$

where: $k = 0, 1, 2, \ldots$ – the number of failures occurring per time t; ω – failure rate parameter.

The procedure for converting the resulting probabilities of the failure rate into production figures is as follows. At these values, the production zone receives the failure rate determined by the expression: $a = \omega \cdot \mathrm{t}$. If you take the time $t = 1$, we get $a = \omega$. For the case in question, as a result of time conversion to t =1 hour, we obtain parameter a=4, which characterises the average number of failures per unit of time and practically denotes the requirement for faults and failures of assemblies and units. The flow of claims entering enterprises should be seen as the enterprise's programme. In this case, Eq. (3) can be represented as Eq. (4).

$$P_{ka} = (\frac{a^k}{k!}) \cdot e^{-a} \tag{4}$$

In Eq. (4), for example, parameter a=4 means a combination of four failures (faults) or a flow of simple requirements to be eliminated. By Eq. (4) it can be calculated the probability of a certain number P_k for a known value of a. For example, for the considered case where a=4, the probability of absent claim $P_{k=0}$=0.02 or 2%, the probability of one claim, $P_{k=1}$=0.07 or 7%, probability of occurrence of two claims $P_{k=2}$=0.15 or 15%, probability of three claims $P_{k=3}$=0.19 or 19%, etc. Accordingly, **Figure 2** demonstrates a graphical interpretation of the Poisson law of occurrence of a certain number of failures, obtained for parameter a=3, 4, 5, 6, 7, occurring for time t.

Figure 2 provides an analysis of the probability of site loads and equipment utilisation. Setting a=4 yields the following result: 18% of sites will be loaded close to average, 45% of sites and equipment will be above average, and the remaining 63% of sites will be underloaded. For values of a≤4, such as a=3, the distribution chart of failure probability experiences a change towards greater unevenness in the loading of sites and equipment. As depicted in the graphs, when a≥4, the dependency appears more elongated and uniform, suggesting the possibility of a more evenly loaded structure for the company. Therefore, the representation of random processes of object failure occurs in the form of simple flows, having properties of stationary and ordinary conditions, and lack of consequence. This is described by Poisson's law. This approach aids in conducting a structural analysis of failure flows, estimating the nature of site and equipment loading for the enterprise, and forecasting and developing measures for optimising production programmes and the structure of the car service enterprise.

Transportation's pivotal role in the economy is extensive, encompassing diverse aspects that contribute to overall development. It catalyzes trade, ensuring efficient movement of goods and materials across regions. Simultaneously, it streamlines supply chains, reducing costs and enabling businesses to operate more competitively. Beyond its economic impact, transportation influences urban and regional development by fostering connectivity [13]. Accessible transportation networks attract investments, stimulate growth, and shape the spatial landscape of cities and regions. Moreover, transportation empowers labour mobility, allowing individuals to access a wider range of employment opportunities and promoting economic dynamism.

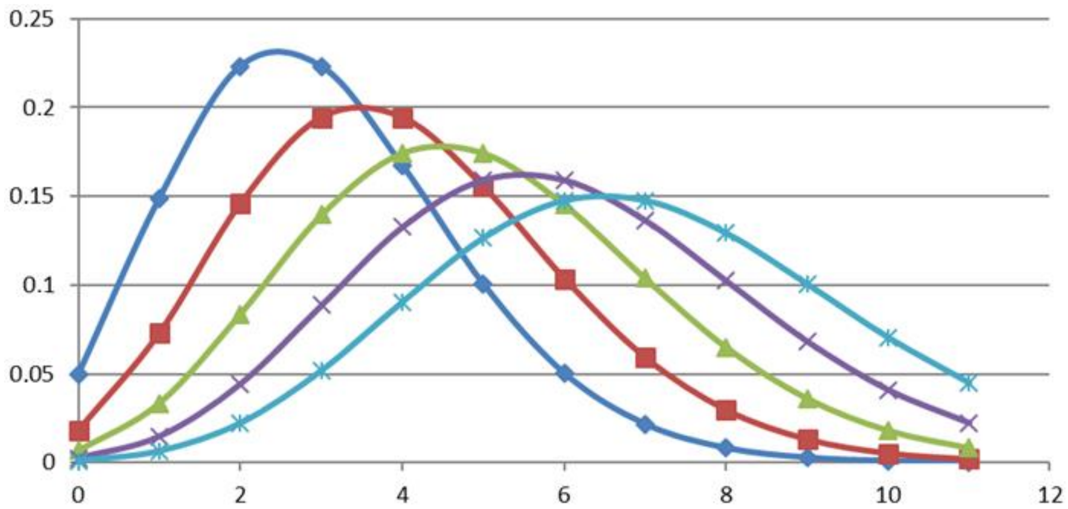

Figure 2. Graphical interpretation of the distribution of failure probabilities

Significant investments in transportation infrastructure, both from the public and private sectors, generate jobs, drive economic growth, and enhance overall stability. Additionally, these systems demonstrate resilience during emergencies, aiding rapid response efforts and safeguarding economic continuity. Finding a harmonious balance between the economic benefits of transportation and its environmental and social impacts is crucial [3]. As transportation networks continue to evolve, they significantly shape urbanization patterns, labour market dynamics, and technological advancements, exerting a profound influence on the trajectory of economic progress.

4. Discussion

The quality of transport route design is important for a country's development: indeed, as described in the paper, the transport sector can take up a large part of GDP, of the order of 10%. Furthermore, as J.-P. Rodrigue [21] indicates, transport plays an important role not only in the economic development of a country but also in the internal processes including social activities. In addition, the development of transport infrastructure is often one of the founding elements of regional development. Thus, the interaction between economic and transport development is diverse and inconsistent. As R.W. McQuaid et al. [3] reported, good transport links, both internal and external, are part of the regional asset portfolio that attracts potential investors in making location decisions. Of course, the level of impact of transport on business activity depends primarily on the characteristics of the enterprise, its location, the external environment and the nature of the business, but there is a role for transport in all cases. Speaking about the function of transportation for businesses, the authors M. Oszczypał et al. [22] pointed out that logistics is particularly important in modern market economies that encourage competitive markets to move road transport companies towards flexible operating methods and jointly manage sustainably on both macro and micro levels.

The "Regulations on technical maintenance and Repair of road transport rolling stock" [23], issued by the Ministry of Road Transport of the RSFSR, is an important document defining the technical policy for the maintenance and repair of road transport vehicles in the Soviet Union as well as in the post-Soviet area. The document covers such key aspects as safety, standardization, preventive maintenance, technical expertise, use of spare parts, accounting, environmental aspects and state control. The document ensures the safety and reliability of vehicles through detailed instructions, and standardized procedures, and promotes preventive maintenance to extend the life of vehicles and minimize breakdowns. The regulations call for qualified service technicians, and emphasize the importance of quality parts and responsible environmental stewardship. With government participation, these regulations ensure uniformity and efficiency in the maintenance of the country's road transportation infrastructure.

The development of road transport facilities includes several regulated items and design phases such as permits issue, feasibility studies and direct design. In return, the last section contains points that are subject to justification and detailed elaboration: technological, construction, feasibility, organisational, construction, environmental protection, design and estimate documentation, explanatory memorandum, master plan and project passport [24]–[26]. The basis for completing these sections is the justification for the production programme. A special argument towards the justification of the annual production programme of car service stations is the result of market research on CSS demand in a given region or city at a given time in case when existing standard projects cannot take place. Accordingly, this determines the programme, structure, size and organisation of the production process in the individual CSS. At present, the main car service companies in the country's road transport complex can be conventionally categorised into several types. Among them are complex enterprises of industrial production associations and enterprises of various forms of ownership. It can be enumerated special and specialised enterprises of large private organisational forms, dealer centres of large car enterprises generally located in regional centres and cities with a developed material and technical base for warranty or contractual service of branded vehicles as well as a network of medium and small CSS for maintenance and repair of vehicles, mainly personal cars.

In a market economy, the organisation of economic activities of transport companies depends primarily on the availability of a stable and balanced production programme. The latter ultimately determines the volume of production in financial and nominal terms, the level of material and technical base and the structure of the production base. The production programme of the first transport groups of enterprises can be organised based on contracts with production entities of various forms of activity and economic entities for the management of transport processes. For these groups of companies, the production process can be organised quite stably, as the appropriate material and regulatory basis is in place to ensure the operability of the rolling stock. However, the understanding of the essence of the production programme has changed somewhat in the current context for enterprises and business entities. As F. Cassia and M. Ferrazzi [27] described, the production programme is the result of the interaction between financial, marketing, technical and production services, determining the volume, range and timing of products produced and sold. The majority of vehicle service companies, including those in the private sector, operate according to a "wait-and-see" failure system, which characterises their processes as random [7].

In this paper, authors suggested that the number of average orders per day should define the mode of operation of a company: this will determine the most likely number of failures and the probability of their occurrence and therefore determine the likely workload of the company. However, A.N. Semernin et al. [4] suggested another method of forming the operating mode of transport companies. These authors have offered the creation of the programme by calculating individual company performance indicators, such as the number of days a vehicle is idle, the number of vehicle repairs, the annual mileage of vehicles, etc. Although this methodology is fundamentally different from the one presented in the paper above, it does not contradict it, as it is based on different indicators used for the calculations. Thus, the efficiency of a transport company's activity can be increased by using both daily load and failure rate data as well as vehicle wear and tear and repairs. Other scholars, namely O.S. Tamer et al. [5], have considered similar parameters for the creation of the annual plan. The main indicators in their work featured to create a programme are the average number of vehicles, the vehicle output ratio per production line, the nominal and actual load capacity, the average daily mileage and others. Their work calculates the indicators for devising a plan for some vehicles using empirical data variables.

Another work in which scientists offer their methodologies for improving the working methods of road transport companies and the formation of their annual programme is the research of O.N. Yarkova and A.V. Trufanova [6], where the researchers also describe the process of vehicle operation as featuring a certain number of random outcomes. The same method goes using Poisson's law [28]. Here the researchers suggest calculating vehicle reliability, wear and tear levels depending on mileage, freight and transport volume and other indicators to determine which vehicles are most effective for running such businesses. All of these indicators affect the ultimate profitability of the company, and the most profitable for the company is to use vehicles with zero mileage. However, knowing the approximate condition of the vehicles and their expected operating time with an account of future mileage and traffic volumes, it can be arranged overhauls schedule to make the operating period longer and more efficient. Note that some enterprise figures may differ depending on vehicle type or brand. Therefore, although the researchers used some similar methodologies to those used in the authors' paper, the present work lets other methods be used to increase the efficiency of the transport company owing to completely different key indicators applied for the calculation. This is likely to generate a certain synergy effect, i.e., improve the mode of operation of the transport company even more. Finally, it should be noted that the analysed papers do not show any methods of forming an annual programme for a transport company that would be too similar to those used in this paper, which makes it unique.

5. Conclusions

This research examines the complexities of the work programme and orders portfolios of car service stations in the current context, with a focus on maintaining stability. This study provides an in-depth evaluation of the transport industry's contribution to national development and the intricate relationship between economic growth and transport companies. It highlights the multifaceted nature of these dynamics.

The production programme of vehicle service companies is created through an intricate interaction of marketing, financial, operational, technical and production aspects. This process is well-explained with statistical data. This article demonstrates through examples that eliminating the faults of individual assemblies and units is necessary to eliminate simple failure rates at a specific production site. The authors have described the procedure for converting the resulting probabilities of failure rates into production figures. They obtained mathematical models in the form of third-degree polynomials, which accurately describe the dynamics of the number of failures and their probabilities over time intervals with correlation coefficients of R=0.9703 and R=0.9046 and standard errors of 55.56 and 0.005. According to the authors, a fault flow that consists of a combination of four failures does not guarantee even loading for the enterprise in question. The authors suggest expanding the types of services offered to customers to optimise the production programme and load uniformity at car service stations and sites.

Other methods for establishing an annual programme for a transportation company were also investigated in the paper. The authors indicated that they have distinct principles for compiling it, primarily based on vehicle wear and tear, operation, and load capacity. The method introduced in the paper is rather unique. The study's novelty stems from its in-depth evaluation of the role of transportation companies in the country's development. The authors acknowledge the intricate relationship between the transport industry and economic development, noting that it is multifaceted and not immediately apparent. Although this complexity poses a challenge for analysis, it also motivates the need to identify innovative strategies to enhance industry efficiency.

Author's Declaration

Authors' contributions and responsibilities

The authors made substantial contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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Availability of data and materials

The data that support the findings of this study are available on request from the corresponding author.

Competing interests

The authors have no conflicts of interest to disclose.

Additional information

No additional information from the authors.

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