



Implementation of the new automobile logistics division

Case: transport enterprise “STL”

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Abstract

Every company dreams of being a leader in its business and occupying the first lines of ratings. Therefore, Sistemy Transportnoi Logistiki Ltd. and I decided that company should update the list of services and become a full-fledged supplier of crushed stone from the manufacturer to the final customer.

Next year, the company has a lot of orders for the supply of crushed stone, and in order to get the maximum profit, STL should introduce a logistics service for the delivery of bulk cargo by road. It is widely known that road transport is more expensive than rail, and a full range of cargo delivery requires a lot of additional machinery and equipment, which will affect the initial investment of the company. It will also be necessary to be prepared to rent some kind of high transshipment platform in order to be able to store and reload bulk cargo from railway transport to road transport. If the thesis shows positive results from the development and integration of the new logistics services department of the company, then the thesis can be considered successful.

This logistics department will be implemented with the help of monitoring and various kinds of documentation. Definitely calculation part should include flow analysis and a large number of both mathematical and engineering calculations.

Research methods - factor analysis, synthesis, forecasting, statistical processing of results, induction, deduction.

Transport is the "artery" of the enterprise, connecting material flows. In this regard, the role of automobile transportation as a key logistics function of the enterprise increases.

The practical significance of the work lies in the fact that some of its provisions in the form of material in subsections can be used by specialists of Ltd "STL".

Still, the main goal of the thesis is to create a profitable plan for the implementation of automobile logistics. As we know, the word and the concept of "profitability" are different everywhere, for the "STL" Ltd., profit is 7+% out of total revenue.

After the successful implementation of the new automobile logistics department, it is expected that it will cover a larger market for the supply of bulk non-metallic materials and also a much larger turnover of money, which will have a positive impact on the domestic labor market, which will undoubtedly have a good impact on the reputation of "STL".

Keywords/tags (subjects)

Bulk non-metallic materials, Road logistics, Storage, Division integration, Railway, Dump truck

Miscellaneous (Confidential information)

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1 Introduction

Currently, there is a need to use a logistics approach to the organization of cargo transportation and the provision of transport services. The objective need for logistics organization of work at a transport enterprise can be explained by the following reasons: first, the integrated logistics tools that synthesize the methodology of general systems theory, system engineering, cybernetics, marketing, management and other scientific disciplines allow to comprehensively solve the problems of organizing the movement of material flows from their places of origin to places of use; secondly, logistics creates conditions for removing contradictions between different participants in the transport process, as it involves the integration of economic interests of all participants in logistics chains and systems. The main goal of logistics is to organize activities in such a way that the level of service will be maximized. This science helps to find the shortest and safest ways to deliver the product to save time and resources.

The approach to the objects of ensuring the movement of goods as systems expresses one of the main features of logistics-both science and practice. Systematic research is a natural necessity of scientific and technological progress, which allows combining and using the most progressive and effective methods available to science of logistics. When studying any systems, we are faced with the problem of identifying the principles of their construction, functioning, and interaction of systems with the environment. In simple terms, as people say in Russian Federation – “The more we learn, the less we know” (Legus 2013). This means that when implementing a new system in a transport company, there are a sufficient number of new problems that the company will face with. After all, until a person immerse himself or herself in the new area completely, he or she will not know all the nuances and will not understand what difficulties can be.

In the market of transport companies, there is a company called Sistemy Transportnoi Logistiki Ltd., which mainly offers services for the transportation of bulk materials by rail. At present, there is a need to improve the company's logistics processes and services. Therefore, due to the fact that there are some open state tenders for the construction of a new section of the M-8 road (Ati member 2021) and due to the great interest and the opportunity to invest working capital in modernization and further payback of funds with also bringing a constant profit, the company together with me decided to fully implement the innovation in view of the full range of services for the delivery of non-metallic bulk materials for the needs of the end customer.

The purpose of the thesis basically is to develop, optimize, design and provide a general business plan for the implementation and development of logistics services by the road division in “STL” Ltd. There is an idea to make an introduction of new transport division in the company, so that they will be engaged in the delivery of bulk non-metallic materials by rail in the volume required by the request of the client from “Chevzhavara” quarry to the Vologda region of Russian Federation for the needs of transport construction or individual customers, with further storage and transportation of cargo by road using dump trucks. All idea of the introduction is offered in order to increase the volume of delivery and extract maximum profit in the provision of cargo transportation services and also to be known on the market of Russian Federation.

Only on the basis of accurate calculations and analysis it is possible to develop rational resource-saving schemes of cargo transportation. The right economic decision is the key to the successful development of a motor transport company and its stable profit. Thus, the chosen topic of work is quite relevant and the main tasks of the thesis are: find the prospects for the development of the road network in “STL”; to make the company one of the key suppliers of crushed stone in Vologda - to have a market coverage of 40+%; implement the road transportation of bulk non-metallic cargo, so, they transported directly to the final consumer; do the feasibility study (technical and economic basis) of enterprise development.

Therefore, concluding the previous explanation, the study raises the following research questions: the main question is to evaluate the benefits of the plan for the introduction and optimization of road transport department in the “STL”. As well as to do the design and develop the feasibility study of the enterprise. Moreover, one of the important problems of the study is that there are large unused capacities in logistics processes in terms of not providing a full range of services, using forwarding services and overall quality of service, which need to be addressed systematically, mathematically, rationally, but taking into account a differentiated approach. Likewise, worth thinking about the verification of possible profits, which can be briefly described as modeling the cash flow, costs and profits from the introduction of a new road transport division and a site with the bulk cargo transshipment and storage. Furthermore, there is a personnel issue, currently there is a shortage of qualified specialists who have not only the practical experience in the field of road logistics, but also theoretical knowledge in this field.

Thus, it is suggested that the company make the transition to full provision of services from the manufacturer of cargo to the end user. It is so, because next year there are tenders for the provision of services for the delivery of crushed stone and other bulk non-metallic cargo for the needs of the construction company which is engaged in road modernization.

The importance and relevance of the study is due to the fact that in a market economy, only highly organized enterprises with high-quality management can achieve effective work. The developed proposals should be aimed at improving the transport process, increasing the efficiency of the use of rolling stock, reducing its downtime, empty runs and irrational transportation. In the end, the implementation of these proposals can have a positive effect directly on the transport enterprise, improve its main performance indicators and bring additional profit. Moreover, due to the fact that logistics management largely affects the state of financial, economic and legal support in the market conditions of diverse relationships. The logistics system consists of three main blocks of the production process: supply, production, sales. STL is responsible for delivery only, as for supply or sales.

2 Research methods

In the thesis work, the following methods are used - structural methods of analysis and generalization on the research topic, elements of economical and financial analysis, methods of mathematical statistics and logistics engineering, graphical and tabular representation of data. In our case, such methods as theoretical, empirical, and mathematical should be fully used and studied. All calculations in a thesis are in rubles (1 ruble=0,011 euro (at the exchange rate of the Central Bank of the Russian Federation on February 21, 2021)). From the theory, it is necessary to take the modeling, analysis, and synthesis of a new system, in the empirical method, it is worth using observation, comparison and testing, so far only on paper, and in the final mathematical method, economic analysis will be used, which will help to determine all hidden and fixed costs. There will be a lot of calculations and documentation provided by the "STL". In addition, since the task of development was set, it is worth making the modernization plan using the observation method.

The thesis will use quantitative analysis more, because it quantifies data to test hypotheses and predict the future, how the company will handle with exact volume, which is absolutely new for STL, while qualitative analysis aims to better understand why certain things happen like in our case

it is mandatory to find out why customers should choose "STL"? In this thesis, a new model of working with transport and cargo will be developed, so it will be mandatory to predict a lot. The author will conduct surveys to collect qualitative data. Nevertheless, at the same time, methods of quantitative analysis will also be used, such as conducting an experiment based on the success of the implementation of a new system using measurement and observation. Qualitative analysis is exploratory and subjective, while quantitative analysis is persuasive and objective (McLeod 2019).

The analysis of the logistics system, which will be used also, includes several stages:

1) Awareness of the logistics problem.

Logistics problem – the discrepancy between the desired (necessary) and actual circumstances in the field of logistics activities of the enterprise. The correct and precise formulation of the logistics problem is the first and necessary stage of the system research. Problems are determined based on the functioning of the logistics system and the constraints of the external environment. The following requirements can be imposed on the logistics system: flexibility, a clear purpose of functioning, the need for rapid adaptation to changes in the external environment in conditions of political and economic instability.

2) Establishing criteria for evaluating the effectiveness of the new logistics system.

In order to choose the evaluation criterion, it is necessary to know the specifics of the logistics business, the theory of systems and the technology of the functioning of the research object.

3) Structuring the logistics problem.

To define a logistics system, it is necessary to decompose the problem into a set of clearly formulated tasks, build them in a certain hierarchy and outline methods for their implementation.

3 Role and background of STL

Sistemy Transportnoi Logistiki is a transportation company which started with a cooperation with Russian Railways, which stands for RZD only for 5 wagons which are used for haulage of cargo by the railway. The company was founded in 2016 by specialists with experience in various transport areas: railway logistics, road transport, repair, rental and purchase of rolling stock, terminal and

warehouse management, organization of access roads of industrial enterprises, as well as railway construction and supply of non-metallic materials.

Today, STL has all the necessary logistics infrastructure that can be used for the needs of any consigner:

- large fleet of sub-contractors railway cars (covered cars, gondola cars, platforms of various modifications and other rolling stock);
- a single personal account in CTSC Railways to pay tariffs on the territory of the Russian Federation and transit traffic;
- the ability of sending specialist to visits customer's facilities to evaluate the existing technology of transport and the formation of proposals for its improvement;
- railway construction and supply of materials;
- delivery of non-metallic materials.

CTSC Railways stands for The Corporate Transport Service Center and it is a branch of the open joint stock company "Russian Railways". CFTO acts as a single customer on behalf of the client to all involved divisions of JSC "Russian Railways", being the guarantor of quality and compliance with the deadlines for the execution of the order on behalf of JSC "Russian Railways" (Struktura kompanii RZD 2020).

On the basis of long-term contracts with foreign partners, STL can offer a similar services in the CIS and neighboring countries. Starting from ending of 2019, beginning of 2020, the company provides railway design services, supply of materials for railway construction, as well as perform work of any complexity on the construction of railway infrastructure: railway tracks, energy devices and SCBs which stands for Signaling, Centralizing and Blocking devices, in other words, the traffic light to prevent collisions, derailments, and other accidents. Also, development and approval of loading schemes and drawings in accordance with the current rules of transportation and Technical Conditions of loading. Moreover, operational interaction with the participants of transportation - coordination of transportation plans, the schedule of delivery of wagons, customs clearance of transported goods.

At this stage, there are stable orders and stable revenue. The structure at the moment is as follows:

- 1) STL receives an order from the customer;
- 2) the rolling stock starts to work, in the sense that it leaves for loading to the point of production of the cargo;
- 3) railway composition goes with the cargo to the final station, where another company takes over the business, which unloads the cars and carries the cargo to the final consumer.

At this point, the order for STL is considered completed. However, the time has come for the company to modernize its market reach.

The company's slogan is – “Our task is to use our experience and knowledge to offer you the most effective logistics solution”.

4 Theoretical basis of the thesis

Chapter 4 and its subchapters tells about the specific researches on the basis of which this thesis is based. It also shows the information and data needed for the research. As well as methods for analyzing and performing the task of implementing the automobile division in the “STL” Ltd. Pareto's law works here: 80% of useful information is provided by 20% of the sources used.

Since this problem is the subject of an independent study that goes beyond the scope of companies work, it is worth studying in detail all the available reference information and also clearly analyze the problems that it may encounter with. An important point is that when researching and trying to make the most profitable proposals for optimizing labor in “STL”, it is preferably to proceed from the main conceptual provisions of the theory, in order to determine as accurately as possible, the risks and errors that can be encountered.

4.1 Theoretical research

The relevance of logistics as a science and practical activity is emphasized by numerous scientific studies of such specialists as B.A. Anikin, V.V. Volgin, A.M. Gadzhinsky, V.V. Dybskaya, A.A. Kanke, M.N. Kuznetsova, T.V. Levin, G.G. Levkin, T.N. Skorobogatova, O.V. Tolmachev. A large number of “fresh” online materials on logistics were also noted. All of these authors are outstanding theorists of modern logistics activities, in particular automobile, railway and warehouse activities. A lot of materials were studied on the basis of which decisions in the further presentation and finding the right solutions to the topic of the thesis were made.

An important role in the preparation of the thesis was played by the works of such engineers and authors of articles as Bai Xiaojun, Dr. Joy Hecht and G.O. Adeyi, also, several authors of articles in which a team of researchers participated. They were studied by the question of the environmental aspects of the handling of crushed stone (Xiaojun 2001 and Hecht 1997), also about the hidden problems when using dump trucks transportation (PQ Staff 2015), and moreover, they helped to understand the classification of bulk materials (Adeyi 2019).

To begin with, the environmental issues were assessed at the proper level and helped to reflect not only on the benefits of introducing a new logistics department, but also all future decisions will be made with a weighting of environmental standards, such as noise pollution. The noise pollution is the biggest threat, also believes to the Hecht (1997), who said that “Trucking poses threats to the environment from two major quantifiable sources, air pollution and noise. In addition, the use of trucks contributes to land-use related environmental stresses and to the environmental impacts of accidents.”, about the fuel emissions of carbon dioxide is not much to do, and in the previous question we can comply with the laws on the protection of noise pollution bypassing densely populated areas and not disturbing ordinary citizens. As a rule, a single dump truck is 10 decibels louder than a normal passenger car, and a train is 30 decibels louder. Moreover, the Xiaojun (2001, 32-40) in his table 4.1-1 presented an assessment of the pollution that can be caused to the atmosphere when working on dump trucks and bulk material storage sites. In this regard, measures will be taken to reduce the impact or completely prevent such examples of pollution. This can be achieved with caution and interest, because methods to exclude such types of pollution exist and they just need to be carried out.

The study by Adeyi (2019) helped to understand the difference in bulk materials, and the results of the study were used to analyze the necessary activities of the company, as well as to familiarize readers in paragraph 4.4. The article by PQ Staff (2015) drew attention to the problems of weight control which indicate the importance of using weights to avoid any fines and vehicle breakdowns, and administration of work on the site for the storage and transshipment of bulk products which says that you should follow the rules of POT RO-14000-007-98 (Sudact 2021). This law specifies a list of requirements for the administration of bulk materials storage sites.

4.2 Transport structure theory

An important concept of transport logistics is the concept of transportation process, which is understood as a set of organizational and technologically interrelated actions and operations performed by a transport enterprise and its divisions independently or in coordination with other organizations during the preparation, implementation and completion of cargo transportation.

By a “Rosstat” (2020) a special place among the various types of transport is occupied by automobile. It is more mobile in nature and less dependent on external factors. In most countries, including Russia, road transport occupies a leading position in terms of cargo and passenger transportation. This type of transportation is extremely flexible in terms of routes and schedules. Any market enterprise, especially – transportation, one of the main tasks for achievement of the goal (increase in profitability of activity) sets the expansion of the type of activity and market. More visible about percentage of transport usage in Russian Federation in Figure 1.

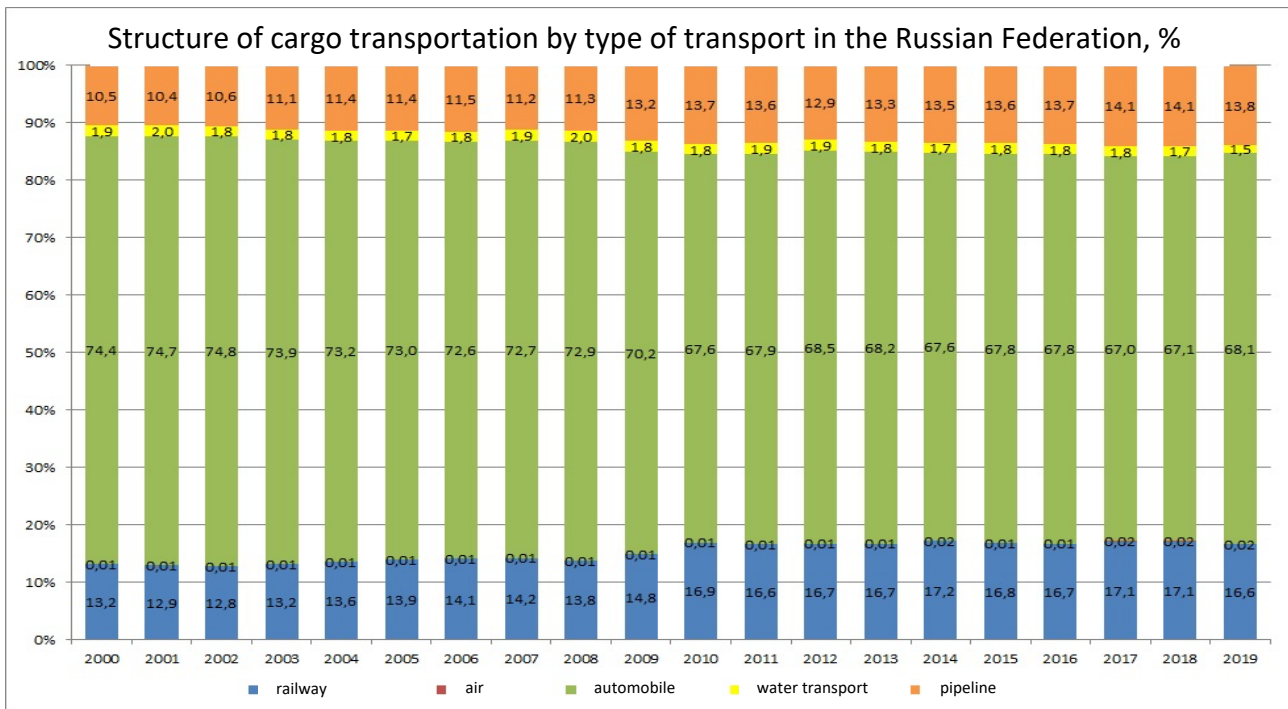


Figure 1. Cargo transportation by type of transport in the Russian Federation (Rosstat, 2020)

It follows that road transport actually plays not a small role in Russia; therefore, it is necessary to take part in this spectrum. Nevertheless, according to Tuzov and Sabelnikov (2019, 12), almost 30 percent of road transport is carried out by minibuses and GAZelles, then about 30 percent go for euro trucks, and the remaining 10 percent is taken up by dump trucks. It follows that the market is already familiar with this type of transportation and before the implementation it is better to pay attention to such a source which refers to the already known errors in the experience of implementing dump trucks in their work, for example, according to Yefremov and Voronkov (2019, 2), an analysis of the causes of downtime of the quarry vehicle fleet, which includes the most famous MAZ, allowed to establish that 25% of downtime occurs due to a breakdown of the tipping mechanism. To prevent hydraulic cylinders from failing, as well as breakdowns in the places where they connect to the body and frame, it must be anticipated such a thing as a device for limiting the angle of tipping of the dump truck body, which was invented by the outstanding mechanic of the Soviet Union Melik-Sarkisyants (1985). MAZ was clarified, because the thesis will consider the purchase of several dump trucks of this brand, MAZ wins over other brands of dump trucks, such as MAN, VOLVO, TONAR, KAMAZ and others in the price-quality ratio (Skvaladze 2020). This is proved

by Goodtechnik (2020). The author said that good cross-country ability on any off-road, excellent maintainability and availability of spare parts for restoration are the benefits. Also, let us consider the main advantages of MAZ 6516 8x4 dump truck on the example of its technical characteristics: If the dump truck goes “idle”, that is, during empty transportation, the rear axle rises, thus, for every 100 km, up to 2 liters of fuel are saved. Moreover, the traction dynamics of the MAZ in comparison with trucks of other manufacturers, which often slip when driving on a snow-covered or polluted roadbed, the MAZ dump truck easily overcomes any obstacles on the way. This was made possible by the increased traction dynamics of the machine by about 35% compared to the traditional scheme (MAZ staff 2020). Thus, for domestic operating conditions, it is difficult to find a more reliable and functional machine than the MAZ dump truck. Therefore, it is not yet possible to find an alternative to it in various industries. Therefore, the MAZ dump truck was chosen as the main type of transport, respectfully, we can trust the above research.

Further, loaders will be required for loading dump trucks and unloading wagons. As the main and initial type of loader, it is recommended to choose the XGMA, because the XGMA XG955H wheeled front loader with a load capacity of 5 tons is able to maintain high performance in difficult working conditions. This front loader is successfully used in quarries in the development of bulk cargo, in the construction of highways, railways, bridges, tunnels, etc. The high reliability of these machines is confirmed by long-term experience of operation in the engineering troops of the People's Republic of China. At the same time, it is very economical, providing fuel consumption per hour up to 3,34 liters less than that of similar products. As for the competitive advantages, it is primarily dual-circuit hydraulics, significant fuel economy, resistance to cold, as the woman at the dealership said (Perepechina 2012).

Onwards, In Russia, all trains are owned by very large companies, such as SberBank, Russian Railways, VTB and others (VAGON1520 2019). Currently, STL working directly with RZD, which is enough to carry out full-fledged work on the transportation of bulk non-metallic cargo in the volume of 100 thousand tons per month (STL 2021), which is enough for the needs of customers.

Sistemy Transportnoi Logistiki organize railway transportation with various rolling stock: covered wagons of various models, that are used for the transportation of piece and tare-piece cargo, packaged cargo, expensive devices, mechanisms, machines, and other valuable goods that require

protection from the influence of weather conditions, mechanical damage, and other external influences; gondola cars, which are designed for the transportation of bulk cargo (ore, coal, fluxes, timber, etc.), containers, and other goods that do not require protection from precipitation; and other rolling stock - for transportation of machinery, mineral fertilizers, grain cargo and other products of industrial enterprises (IPL n.d.).

4.3 Occupational health and safety theory

When working on loading/unloading operations, it is required to behave as correctly as possible in terms of safety, and there are also a huge number of requirements for the condition of transport and cargo, this is regulated by the law on labor protection of the Russian Federation (2021). Preferably to discuss the driver of the dump truck and the people involved in unloading wagons.

The driver of the dumptruck is obliged to: observe the internal regulations and labor discipline; timely and accurately execute the orders of the administration; observe technological discipline, requirements for labor protection, safety and industrial sanitation; take care of the property of the enterprise; observe the order of movement on railway tracks and roads; know the values of the safety signs used in the enterprise, sound and light signals, be attentive to the signals given and comply with their requirements (Ohranatruda and STL n.d.). Then, the person who will comply with the STL (2021) rules and labour protection of Russian Federation (n.d.) rules will have to adhere the most important and basic rules, such as when unloading bulk cargo (gravel, sand, crushed stone, cement, etc.) from dumpcars, hatches must be opened with special devices that exclude the presence of a worker under the hatch during its opening. During the maneuvering of the railway train, when feeding the cars to the place of unloading or loading, it is forbidden to ride on buffers, footrests of head auto couplers, to cross the tracks under the cars standing under loading or unloading. Before unloading railway transport, the worker should carefully inspect the condition of the cargo and wagons. If any malfunctions are detected (misalignment, breakage of racks, unreliable linking), without starting to unload, get instructions from the responsible person about the method of unloading.

In our time of pandemics, it is also necessary to strictly follow the rules for maintaining health. It is important to keep a social distance, wear masks and use sanitizers. With symptoms of coronavirus, it is required to maintain a self-isolation regime.

4.4 Crushed stone and other non-metallic bulk building materials theory

The category of bulk cargo accepted for transportation includes such non-metallic building materials as:

- sand
- crushed stone
- limestones
- pebbles
- gravel
- peat-based soils
- expanded clay
- clay
- chalk, etc. (Trendexmexico n.d.)

The first four types of non-metallic materials are in great demand. Due to their properties and characteristics, they have found applications in many industries. This includes the construction of road and railway infrastructure, the production of reinforced concrete structures, the construction of bridges and industrial complexes, as well as many other areas of civil and industrial construction. Naturally, each of these categories will have dozens of subcategories that are more narrowly focused (RMNT 2009). Therefore, it is not necessary to say that non-metallic materials are something incomprehensible and unknown, just in everyday life we are used to calling them by type, and not by a general concept.

According to the rules of cargo transportation by road, there are an Article 12.21 of the Administrative Code of the Russian Federation (2007), building bulk materials in the body should not exceed the height of the sides of dump trucks. The cargo must be securely fastened-it must remain in place during the movement. Dump trucks need to transport the cargo very carefully, otherwise it may fall on the roadway. To avoid such situations, the cargo is covered with a canopy – then the bulk materials will be delivered to the site in one piece. Even if there is no canopy, then in the Russian Federation there are huge fines for transporting without it. Each individual transportation of bulk cargo, depending on the type of material being transported, has its own characteristics and requirements for its transportation. For this reason, it is especially important to organize the staff and especially drivers. Any stage of work here is dangerous, because moving on the public roads

might cause some serious road accidents. However, this cargo is rather easy to store, load and unload.

Important fact for the future - when working with each individual type of bulk cargo it requires a clear understanding of the volume and weight ratio, in the table 1 below presented the most used materials ratio (Bulk material weight and volume calculator, TSK 2021).

Table 1. Volume/weight ratio for most common bulk cargo (TSK 2021)

Name	In 1 ton
Alluvial sand	0,7 m ³
Sea sand	0,7 m ³
Quarry sand	0,71 m ³
Crushed stone gr 5-20	0,74 m ³
Crushed stone gr 20-40	0,72 m ³
Expanded clay 10-20	2 m ³
Crushed limestone	0,76 m ³
Sand-gravel aggregate	0,71 m ³

4.5 STL data

In order to start counting and buying or leasing something, we need to understand how the company successfully coped with the tasks already set. Modernization should only be carried out if the company has fully mastered the market before modernization, as the outstanding Irish playwright and novelist Bernard Shaw (1900) said: “Achieve what you want, or you will have to be content with what you have.”.

The “STL” Ltd has the following assets presented in table 2:

Table 2. Organizational and economic characteristics of the enterprise (STL 2021)

Indicators	2018	2019	2020	Change, (+, -)		Growth rate, %	
				2019/2018	2020/2019	2019/ 2018	2020/ 2019
Operating income	255 298 180,6P	268 348 181,2P	247 708 181P	13 050 000,6P	-20 640 000,2P	5,1%	-7,6%
Direct costs	237 299 166,1P	253 265 182,4P	221 102 352,2P	15 966 016,3P	-32 162 830P	6,7%	-12,6%
Margin profit	17 999 014,49P	15 082 998,8P	26 605 826,82P	-2 916 016,69P	11 522 828,02P	-16,2%	76,3%
Operating expenses	32 301,22P	51 998,7P	1 082 716,92P	19 697,48P	1 030 718,22P	60,9%	1982,1%
Profit before taxes (EBITDA)	17 966 713,27P	15 031 000,1P	25 523 109,9P	-2 935 713,17P	10 492 109,8P	-16,3%	69,8%
Percentage of profit	7%	5,6%	9,9%				

Despite the unstable economic situation in the country, during the analyzed period, there is an increase in the economic performance of “STL”. In 2020, revenue was 9,9% more compared to 7% in 2018. At the same time, there is a decrease in the operating income, as a percentage: -7,6% in 2020 compared to 2019, when it was 268 348 181,2₽, but still the cost of the order in 2019 increased by 5,1% compared to 2018. Also, due to the increase in order cost, the costs associated with the delivery of bulk materials increased by 6,7% accordingly. Direct costs turned out to be reduced thanks to excellent cooperation with some quarries and earnings on the difference between the ordered price of crushed stone and the purchase price.

In 2020, operating expenses increased insanely compared to 2019, they were 1982,1% upper then in 2019. This was due to transport delays due to coronavirus restrictions. The amount of 1 082 716,92₽ ran up in just 2 days of demurrage of loaded transport on the railway. This money was required to pay the Russian Railways for the idle transport and the occupied railway line. Fortunately, the customer and the government of the Russian Federation compensated 75% of the costs (Mintrans 2020), although the amount of operating expenses for “STL” were still very impressive.

And yet, despite the fact that there are more red indicators, they do not mean that it is bad that this or that indicator has a plus or minus sign. In any case, if the company has a larger order, then there will be more expenses, so the CEO is interested more in the lower indicators of table 2 on page 18, the final profit and the total percentage of revenue. Unfortunately, it is impossible to say that this table justifies itself, because it is worth evaluating specific transportation orders, but the tax service does think differently, so that is how they want it to look like, all under one table. After all, each order is different in delivery cost, purchase prices and other fixed and variable costs.

Previous contracts and profitability will allow to more clearly consider what the “STL” embezzlement went to. In 2020, the company won 3 contracts for the transshipment of crushed stone. The most significant were 2 lots for the won tender from DSU-81. The terms of reference were as follows:

Table 3. The most significant previous contract for "STL" (STL and DSU-81 2020)

Product name	Grade, size	Road polygon	Unit of measurement	The amount (volume)	Price per unit of goods including VAT (RUB)	Delivery price per unit of goods including VAT (RUB)	Total unit price of the product with delivery including VAT (RUB)	Total initial (maximum) price with the VAT (RUB)
Lot №1								
crushed stone	fraction 25-60	301109 KHAROVSKAYA	m ³	89 498	581,07	900,8	1 481,87	132 624 401,2
Lot №2								
crushed stone	fraction 25-60	301805 KIPELOVO	m ³	70 500	587,16	1 338	1 925,16	135 723 780
The initial (maximum) price				159 998				268 348 181,2

Without going too deep, the profit made by these big contracts was about 15 million rubles for the whole contract. Thus, over many years of fruitful work, the company has acquired enough assets to improve the company and make it more diversified.

4.6 Payback period of investments in transport

To begin with, investments are long-term money asset in order to create new and modernize existing enterprises, master the latest technologies and equipment, and increase transportation volume (Safronov n.d.).

Since there is a supply of bulk non-metallic materials by attracted railway transport, a small part of the site will be rented for storage and transshipment of crushed stone, where cars will be parked and loading equipment will work. With an average price of 100 rubles per square meter of the site per month in Vologda region (STL 2021), about 3 500 thousand square meters will be rented. The total cost of rent per year will be about 4 200 000, with security, electricity, etc. included in the rental price.

Based not only on dealer indicators and tips, but also on reviews of real owners, the MAZ dump truck practically does not “eat” money for maintenance. The only problem that can cost an arm and a leg is the brakes (Sergey 2018). With rough handling of transport brakes, you will often have to invest in their replacement. This is also due to the fact that reinforced brakes are installed, after all, the weight of a car with a full load, according to MAZ (2021) can reach 45 000 kg.

As it was decided earlier, we will buy MAZ dump trucks and XGMA loader therefore, the following are the investments that will have to be spent from the STL’s budget:

Table 4. The cost of transport (autoru 2021; XGMA 2021)

No	Name	Cost	Amount of the lease agreement	Monthly payment	Maximum load – volume/load capacity
1	Dump truck MAZ 6516C9-521–005 (EURO-5)	5 000 000₽	7 106 860₽	101 781₽	22m ³ /29 500kg
2	Front loader XGMA XG955H	5 560 000₽	7 899 380₽	113 123₽	3,6m ³ /5 000kg

The most profitable transport leasing options should be chosen, thus, taking into account that we will take from the official distributors the new transport, and under the contract the vehicles will be registered for the lessee, therefore all tax fees and other deductions are included in the monthly fee. The following parts of the agreement are also taken into account:

- First instalment of 20 %
- Lease repayment period - 60 months (5 years)

These results based on the information which is published on websites for the sale and leasing of trucks and other heavy equipment, and they are auto.ru and xgma-russia.ru (2021).

For truck costs, consider the following figures: we take as a reference the average figures for the Vologda region and the companies operating there, such as TransitInert (2021) and SvetAvtoTrans (2021). During a telephone conversation, it was discussed that on average, these companies spent 116 732 and 114 124 thousand rubles per month on dump trucks, respectively. Next, we conclude that an average of 115 428 rubles is spent on all possible expenses for a MAZ 6516, they are - wages, depreciation of vehicles, fuel, tire wear, taxes and maintenance. At least 5 dump trucks will be required for a good income and faster payback. Also, after the payback period is done and constant profit comes, it will be significantly higher than with a one-time purchase of a smaller amount of transport. Moreover, it makes no sense to carry bulk cargo from another region, store it and load it with own loader with less transport. Furthermore, the "STL" wants to establish itself in the new market as a prestigious and independent company. As for the economic component of the loader, it could be said that according to the calculations of one of the owners (Avnstroy 2012), it spends on depreciation, fuel, salary, tax fees and etc. in the amount of 35,2 rubles per working hour and one ton of cargo will cost the loader 1,64 rubles.

Taking into account that the private sector is actively being built up in Vologda region, on a dump truck with its own loader and already with all tax deductions, salaries and depreciation, it is possible to earn about 350 000 rubles a month net working non-stop with constant employment on a specific contract (Samosval.info 2021) and 300 000-400 000 working for private individuals (Beboss 2021), but no volumes can be guaranteed here, because bulk non-metallic materials are a seasonal product that is mainly used in the dry seasons. Therefore, in order for the payback period to be as fast as possible, it is better to work more on contracts with a constant certain required

amount of delivery. Thus, with an average income of 350,000 rubles a month, the basic idea of payback periods under ideal conditions is described in figure 2.

Year	1	2	3	4	5	6	Sum
Revenues	21 000 000,00	21 000 000,00	21 000 000,00	21 000 000,00	21 000 000,00	21 000 000,00	126 000 000,00
Expenses dump truck	6 925 680,00	7 271 964,00	7 389 566,77	7 307 458,11	7 326 547,02	7 460 729,09	43 681 944,98
Expenses loader	156 960,00	164 808,00	265 200,40	165 612,42	166 045,04	316 499,29	1 235 125,15
Administrarion expenses	4 200 000,00	4 200 000,00	4 200 000,00	4 200 000,00	4 200 000,00	4 200 000,00	25 200 000,00
Profit	9 717 360,00	9 363 228,00	9 145 232,83	9 326 929,47	9 307 407,94	9 022 771,62	55 882 929,86
Investments in transport	16 151 072,00	7 464 336,00	7 464 336,00	7 464 336,00	4 889 600,00	0,00	43 433 680,00
Cash flow annual	-6 433 712,00	1 898 892,00	1 680 896,83	1 862 593,47	4 417 807,94	9 022 771,62	12 449 249,86
Cash flow cumulative	-6 433 712,00	-4 534 820,00	-2 853 923,17	-991 329,70	3 426 478,24	12 449 249,86	1 061 943,24

Figure 2. Payback period (TransitInert 2021; SvetAvtoTrans 2021)

The figure shows the expenses and simulated payback period. In the expenses part it is seen that the expenses increase every year on 5%, due to mileage, the amortization, increased fuel consumption and service costs are included in this extra charge. Moreover, it is seen in the 3rd and 6th years, the expenses are much higher from others, this is all due to the fact that these particular models of transport require a complete replacement of all technical fluids and lubricants and all technical services in such a period (MAZ 2021; XGMA 2021). Moreover, it is shown that the company will have to spend about 6.5 million rubles from its capital in the first year, but, fortunately, it is expected that from the second year on a permanent basis, the company will begin to make a profit in the amount of slightly less than 2 million rubles, thus, it is expected that after four years of losses, the company will begin to make its first profit. Thus, it can be noted that in the fifth year, the company, even if investments in transport remain relevant, will begin to recoup them, and in the first year of profit (5th simulation year), it will be equal to about half of the profit, and in the last simulated year, when the company stops paying a fixed amount as a leasing investment, the turnover will be exactly in the amount that it expects to receive from the profit. As we can see, due to depreciation and increased transport costs, the company will lose about one million rubles from the profit in 6 years, but even with this way of simulation, the profit will remain on a good

level. In the final table, in figure 2, called “sum”, it can be seen that after 6 years, return on investment will be up to 1 061 943,24 rubles, which is 128%, in the next years this figure will only grow. More clearly and concisely, the information from figure 2 is presented in figure 3

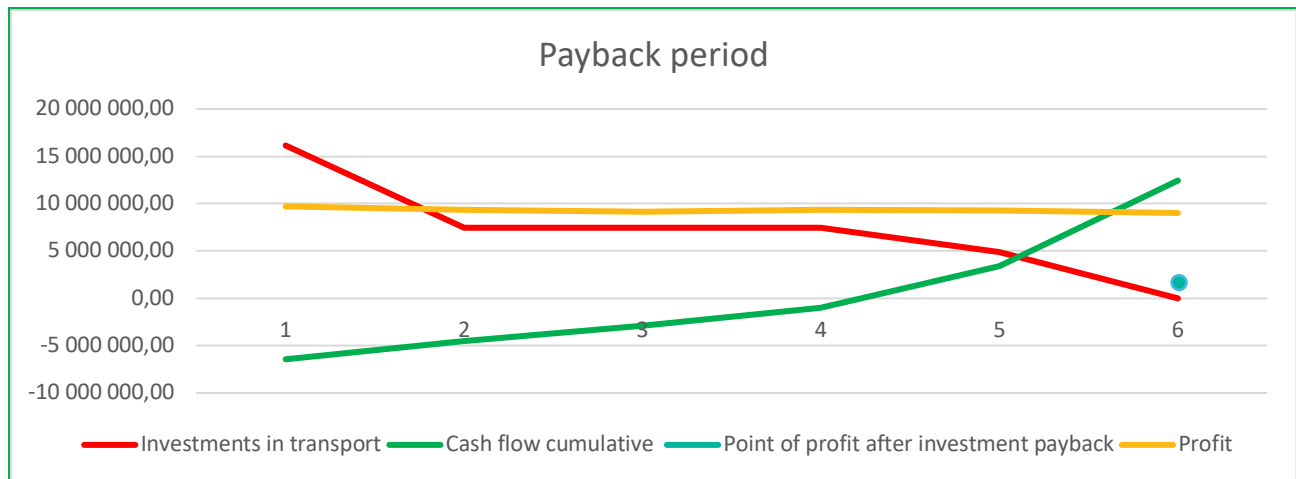


Figure 3. Payback graph

4.7 Key Performance Indicators

In the life cycle of some organizations, eventually there comes a time when the management loses control over the processes that are taking place or simply does not cope with the scale of orders, and therefore with the analysis of each employee as a working unit and also transport performance. In such a situation, it is fair to raise a person or, on the contrary, to deprive him or her of a bonus only on the basis of personal observations. In giant companies, this is almost impossible — something will definitely hide from the eyes. In order to improve the performance of their “offspring” on a daily basis, experts suggest that managers resort to a certain evaluation principle. But in order for the result of the innovation to be tangible, it is necessary first of all to understand what it is - what the abbreviation KPI means and how it stands for, what are the key performance indicators and indicators of the enterprise.

Key indicators are used for all levels of positions, that is, from the management of the enterprise to the ordinary employee. They analyse:

- performance - measuring the nature of achievements and their number
- cost - the need to invest additional resources for individual tasks and their size

- functionality - the relationship between existing business tasks and ongoing processes
- efficiency - matching the result to the effort, time, and investment spent

All metrics are conditionally divided into 2 types:

- lagging - analysing the situation based on the results obtained for a specific time period
- proactive - aimed at projecting future progress

For clarity companies in the Russian Federation use 1C and Trello as a board (Feelwave 2019). This is a standard Kanban board that allows us to structure the tasks facing both each employee of the department and the company as a whole. For the project manager, this is a great find to constantly see what is being worked on and how it is necessary to adjust the actions of the staff in order to achieve the goals set.

It is better to take your time and not introduce the KPI system immediately in the entire company. To begin with, it is better to test it at one branch in order to work out the new payment system and other related processes. Moreover, because this system is not easy to implement, it should be adhered to certain rules and principles that can become indispensable helpers when switching to KPI.

Also, there is a CRM. It is a more complex system of KPI that allows us to analyse the quality of business processes in the company using something like a data bank. In fact, a CRM system can be considered any version of control and accounting that will help improve customer interaction. In many cases, the Russian Federation uses the well-known Excel program to keep records and monitor all the processes performed between managers and clients. With the help of a CRM system, it is possible to track all kinds of conversions, keep records of sales and customers and analyse the main indicators of business performance—revenue and profit (Databox 2018).

One important thing to mention is that it is better to build your own KPI system without previous observation of other companies, it must not be based on others. What is appropriate in one case (and in due time) may not be acceptable in another. Therefore, instead of adjusting the mechanisms to unknown standards, it is better to spend a little effort on fine-tuning them: this will not

only save the nerves and good mood of employees, but also increase their productivity, which is the ultimate goal of implementing key performance indicators.

The most important question is exactly where and how to start implementing KPI. Criteria and choices can be either individual employees or entire departments. In rare cases, when the company in question is narrowly focused and the number of employees is up to 10, it is more logical to choose a specific department for the experiment. Usually, as a test period, you can choose a month for conducting research, after which you can take a quarter for the reporting period. (KPI - key performance indicators, goal 2020)

Specifically, for the "STL" it can be attributed to more logistical problems of the KPI – for example, the share of orders, timely delivery of the cargo, that is, the transport must arrive on time, in a given time window. Timely return of documents, the driver also must promptly return the transport, signed invoice to the consignor or the consignee, so as not to delay the payment terms, compliance with labor discipline. Based on the current level of labor and the market these criterias are the main ones and their actual rate should exceed 90% success rate (Abc-logic 2020).

Then moving closer to look on KPI in RZD. Today, in the conditions of the modern economy, which is characterized by the dynamism and uncertainty of the external environment, each enterprise must build an effective management system for successful work, justification and adoption of timely management decisions that will meet the requirements of the constantly changing external and internal environment of the organization. For any enterprise, the main task is to create conditions that will contribute to the effective functioning and strengthening of the company's competitive position in the market (Sorokina 2017, 76-79). To implement this task, a person needs to define the main strategic goals of the company, as was said earlier their indicators at various levels of management. In 2014, Rosimushestvo published guidelines approved by the government of the Russian Federation on the use of key performance indicators by state-owned corporations, companies, state unitary enterprises, and business entities, in the authorized capital of which the share of the participation of the Russian Federation, the subject of the Russian Federation in total exceeds fifty percent, according to which the boards of directors of state-owned companies must develop their own KPI system, approve the target values of indicators, having previously agreed with Rosimushestvo and relevant departments (Bobkova, Lonskaya, 2015, 19-24). Performance management based on key indicators - this is one of the strategic objectives of "RZD" Ltd.

Currently Russian Railways has developed and operates Order No. 1500r from July 27, 2017 “Approval of the procedure for monitoring key performance indicators of the Russian Railways Holding”. (List of modifying documents 2017) There are two aspects of the key performance indicators of Russian Railways:

- the strategic parameters, which include the following management levels: Russian Railways Holding, business blocks, subsidiaries and affiliates of Russian Railways, and branches of Russian Railways at the central level. Set in the development strategy the Russian Railways holding for the period until 2030 (approved by the Board of Directors of “RZD” Ltd. from 23 December 2013, No. 19), long-term development program of Russian Railways and its subsidiaries until 2021, as well as by the order of Russian Railways dated 22 June 2015 No. 1545p “On the system decomposed control parameters of the target state of the Russian Railways Holding for the period up to 2021”
- operational key performance indicators of Russian Railways, including management levels: its branches and their territorial divisions. At the same time, the list of key performance indicators of the territorial divisions of the functional branches coincides with the list of key indicators of the central branches

Let us consider the dynamics of both main logistics and financial performance indicators of Russian Railways on the basis of KPI in the period from 2018 to 2019 in detail in Table 5.

Table 5. Dynamics of the main logistics and financial performance indicators of "RZD" Ltd. on the basis of KPI (AR2019 2019; RZD 2020)

Indicator	Unit of measurement	Actual value for 2018	Target value for 2019	Actual value for 2019	Change 2019/2018, %
Transit volume growth	Billion tariff ton-km	2596,4	2767	2601,3	+0,2
Empty condition of wagons	Billion ton-km	3304,4	3250	3304,4	0
Number of dividends	Billion ₺	8,755	13,364	13,364	+52,6
Russian Railways Holding's EBITDA	Billion ₺	527,4	575	576,9	+9,4
Return on Invested Capital of the Russian Railways Holding for unregulated activities	%	19,0	≥10	17,3	-9,1

Russian Railways is building a new system for managing measures to increase labor productivity.

The key areas of the programs to increase labor productivity in "RZD" Ltd. are:

- Renewal and modernization of production
- Introduction of innovative technologies

- Improving the organization of labor (Epishkin, Petrenko 2016, 92-94)

The analysis shows that, in general, the company's condition is stable, there is a good trend in the main key performance indicators.

The efficiency of any company depends on the productivity of labor. Russian Railways Holding regularly deals with this issue and achieves positive results. A systematic increase in labor productivity is not only a task set by the country's top leadership, but also a natural requirement, taking into account the current economic situation.

Summing up all of the above theory and the theoretical analysis of the literature and plans for the Vologda region allows to identify a promising direction of development of this transport type. Moreover, the road infrastructure development project for the next 10 years is expected by the administration of the Vologda region to be profitable and interesting place for a company engaged in the delivery of materials for the needs of construction companies of highways and public roads, due to the growing pace of development of the region (Strategy of socio-economic development of the Vologda region for the period up to 2030, 2016).

5 Previous experience in implementing dump trucks in a transport company

The author of the course work has chosen to hide his or her name, so we will talk about him as the “author” of the thesis with title: Transport logistics (2009). Here it is appropriate to pay attention to the year of publication. It is so, because in 2009 it used to have less standards, less ecology norms and less government control over the transportation rules.

The author of this course work tries to convince the reader that if the transportation company will rent dump trucks out of transport which is on account of the transportation company, named CJSC “ATP-10” (Author 2009, 43), it will lead to profit and reduce the fixed and variable costs, the writer has absolutely no estimate of the cost of maintaining this transport, in my opinion, renting out for 6000 rubles a month is absolutely not a profitable business and such actions can only bankrupt this carrier company, because under the contract that is riveted in the attachment of this thesis, only some conditions are visible, the obligations of the parties for servicing, taxation of transport

and other are not spelled out. When a trucking company has 2/3 of all cars idle, it is a terribly dying company that only brings losses. With 18 cars in a fleet, to have only 6 working without downtime (Author 2009, 41), I would go for another direction for the holder of this company, my recommendations would be necessary to modernize the automotive logistics department, either to improve and update the range of services, or to narrow down its transport composition and possibly even change the direction.

Moreover, transportation costs must be presented in detail, because this is one of the most significant parts in the transport sector, without a correct calculation, investors and company owners will lose their investments. My thesis will accurately present the most accurate and specific expenses, also observing all hidden and fixed ones. One thing is absolutely true: the profit from renting dump truck for 72 000 rubles a year is a utopia (Author 2009, 41-43).

As a result of studying this course work, the analysis of which allowed to conclude that in our time this work does not provide any scientific and mathematical justification and finding a solution to the problem. From the point of view of carrying out calculations and contractual validity, this work is completely incorrect and there is no expediency of the proposal for leasing transport. This should not be done by a transport company, because then the meaning and name of itself as a TC does not justify itself at all and such companies have no place in the market. The author also pointed out that "Thus, centralized transportation of goods by road, which is a progressive method of operating rolling stock, is characterized by significant economic efficiency" and "the cost of transportation, as a rule, with centralized transportation is reduced" (Author 2009, 43-49), but this is not always true, due to the fact that with an increase in rolling stock, it can only raise costs in connection with driver salaries, tax fees, car maintenance, etc. These costs will increase the cost several times, because on average, one dump truck costs an average of 100,000 rubles monthly just staying on the parking slot and up to 350 000 rubles working, that does not mean that it will be more difficult to recoup them, but the wording that the cost of transportation will be "reduced" is completely inappropriate in this context. Anyway, it is true that "The practice of the work of a motor transport company shows that the savings received by owners of transport, many times exceeds the "losses" of a motor transport company" although the word "many" is also not particularly suitable here, on average, the profit/cost ratio is 1.5%, and the profit that gets the holder of this transport usually not more than 7-8%.

Thus, concluding an example on a purely the same topic of the course work, it can be said that it is worth not making such mistakes as a complete non-logical denial of the need to make correct calculations, correct documentation and a logical chain of the work.

6 The basis for conducting the study

Sistemy Transportnoi Logistiki carries out only railway transportation, and provides rolling stock (gondola cars, covered cars and other), but also should organise reloading to another type of transport (automobile), as well as storage of cargo at terminals, located in the regions necessary for business. Depending on many factors, such as price, distance from the road, the possibility of long-term cooperation, we will select the best option of warehouse services, provided with STL's loading equipment, and arrange delivery by road to the destination of the consignee.

In the nearest future, it will be possible to supply non-metallic materials (sand, crushed stone, limestone, and others) from manufacturers of the Russian Federation to the Vologda region. Delivery will be carried out by rolling stock and own road transport. Due to long-term contracts with partners, the entire complex of delivery of materials to the end user will be organized: loading dump cars at the quarry, unloading on a high platform for transshipment of bulk cargo with further reloading, in our case, crushed stone, using own loader in own dump trucks and delivery of the cargo to the final consumer. It is planned to serve both private clients and commercial organizations. After the modernization "STL" Ltd. would be able to provide all these services to its partners in the fall of 2021.

6.1 Order of DSU-81

The order description from the construction company is shown below:

WORK SCHEDULE																		
for the reconstruction of the Federal highway M-8 "Holmogory" on the section km 485+800-km 526+800 in the municipal district of the Vologda region. Stage IIIb.																		
Type of the work	Product name and size	Road polygons	Unit of measurement	The amount (tons)	Price per ton of crushed stone incl	Total price for cargo	Price for delivery including VAT	Total price with VAT	Year 2022									
									February	March	April	May	June	July	August	September	October	
Road pavement crushed stone	crushed stone, fraction 25-60	M-8 "Holmogory", 485th kilometer	Tons	151 200,00	1 000,00	151 200 000,00	89 256 333,00	240 456 333,00										
TOTAL								240 456 333,00										

Figure 4. Order (STL and DSU-81 2021)

In the figure 4, it is seen that this order includes absolutely all the figures that interest us for future calculation, from the cost of crushed stone to the cost of transportation, from here later we can calculate how much it is possible to earn on this contract. Moreover, it is needed to deliver all the material in 7 months, starting from March to October 2022.

At "STL" in the charter, the profit is spelled out at the level of 7% to 11%, if in excess of these figures, then this is named as an excess profit, it makes sense to work if this contract will lead to profit not less than 15 000 000P. This order is optimal for our company in question, they are engaged in the supply of crushed stone of this fraction throughout their activity on the market. Therefore, the company already has an understanding of how to work with this type of cargo and there are certain acquaintances in the quarries and in the cars of Russian Railways.

6.2 Assessment of traffic management

A transport service quality indicator is a quantitative characteristic of one or more consumer properties of a service that make up its quality. The quality of transport is assessed by a set of characteristics that determine its suitability to meet the needs of consignors or consignees to the relevant transport. To confirm intentions to participate in the tender every company must provide a view and description of the assessment of traffic management in their transportation company

The material flow that is in the process of transportation is called cargo flow. Cargo flow – the number of goods transported by individual modes of transport in a certain direction from the

point of departure to the destination for a certain period. Moreover, the issue of the level of utilization is also important. This is the ratio of the actual volume or weight of the cargo being transported to the total capacity of the vehicle. The calculation takes into account the volume and load capacity of the vehicle or the volume weight of the cargo.

The utilization rate is calculated as a percentage of the optimal load. Here is an example. Let it be that 21 cubic meters were loaded into a dump truck with 22 cubic meters FTL. The load capacity of the car is 29.5 tons, and 29 were loaded. Accordingly, the utilization rate will be 96.8%. It is almost impossible to achieve a 100% utilization rate. In particular: loads of non-standard shapes or sizes (too long or wide), often do not allow optimal use of the volume of the vehicle. It is also necessary to take into account the limit of load capacity and capacity by volume: for example, when transporting expanded clay fraction 10-20, the vehicle will be completely filled, although the load capacity of the car will be used only for half of the maximum.

The nomenclature of freight transport quality indicators used in the field of freight transport quality management and it is defined by Russian State standard on 1 January 1997 - GOST R 51005-96 "Transport services. Cargo transportation. Nomenclature of quality indicators". (Catalog of national standards 2021)

The choice of the nomenclature of quality indicators is justified by:

- the characteristics and features of the transported cargo
- the type of transport and communication used by the rolling stock
- features of freight forwarding
- requirements for the transportation process
- tasks of quality management of transport services
- the composition and structure of properties that characterize the quality
- the main requirements for quality indicators

According to the standard mentioned above, the quality indicators of transport services must meet the following basic requirements:

- promote the quality of freight transport to meet the needs of consumers (individuals and legal entities)

- characterize all the properties of cargo transportation that determine its suitability to meet certain consumer needs in accordance with its purpose
- to be stable
- contribute to improving the quality of freight transport
- avoid interchangeability of indicators in the comprehensive assessment
- of the quality level of freight transport

Indicators of the quality of freight transport, in accordance with the standard, form a system of indicators and are used for rationing and evaluating the quality of transport services.

At the first level of the system, three main indicators of the quality of cargo transportation are displayed

- safety of transported goods
- timely delivery of transportation
- cost-effective

The second level displays the group indicators of each of the three main indicators. The safety of the transported goods includes indicators of the safety of transportation without loss, without damage and without contamination. The timeliness of transportation includes indicators of the regularity of cargo arrival, indicators of the urgency of cargo transportation, indicators of cargo transportation by the appointed time. Economic indicators include: the percentage of transport costs in the cost of production, the specific cost of transporting goods by various modes of transport, the specific total cost of delivering cargo, the cost of performing loading and unloading and storage operations.

The third level is a single indicator of the quality of bulk cargo transportation. It is presented in more detailed in Table 6.

Table 6. Single indicators of the quality of transportation of bulk cargo in “STL” Ltd. (STL 2021)

№	Group indicators	Characteristics of group indicators	Single indicators	“STL” indicators
1	Indicators of cargo transportation without cargo loss	Characterize the property of the transport service to keep the number of cargo items the same at the beginning of the transport and after its completion.	1.1 Unit costs of unsecured transportation	500P
			1.2 Percentage of cargo lost during transportation	0-0,001%
2	Indicators of cargo transportation without pollution	Characterize the property of the transport service to maintain the purity of the transported cargo in accordance with the established requirements.	2.1 Cargo pollution coefficient	0%
3	Indicators of the regularity of cargo arrival (dump truck)	Evaluate the delivery speed	3.1 Average time of cargo transportation	1 hour
			3.2 Average deviation from the average time of cargo transportation	5 min
			3.3 Percent of the arrival of the goods more than the time	0-0,1%
			3.4 The value of the daily mileage of the vehicle	360 km/dump truck
			5.7 Percentage of cargo arrivals during the standard time	98%

Table 7. General transportation indicators (Isoraite 2005, 111-115)

Transportation indicators	Description of the transport indicator
Volume of transport work (cargo turnover) in ton-kilometers	It is calculated by summing the completed ton-kilometers for all trips, obtained by multiplying the weight of the transported cargo by the distance of transportation (mileage with cargo) for each trip.
Labor intensity of transportation	It represents the amount of labor spent by all categories of employees (drivers, workers of loading and unloading points, repair workers, administrative and managerial and maintenance personnel) per unit of transport work performed for a certain period (usually for a year); measured in person-hours per 100 t-km.
Quantity of cargo transported in tons	It is determined by the waybills by summing up the amount of cargo delivered to the destinations.
Working fleet of rolling stock	A serviceable and serviceable fleet of railway vehicles and motor vehicles (tractors and trailers) that can be used for transportation.
The coefficient of technical readiness	The ratio of the number of car-days of the rolling stock being in a technically serviceable condition to the total number of car-days.
Coefficient of unevenness of transportation	Estimates the change in the volume of traffic in tons by time, i.e., by quarters, months, weeks, days, and hours.

Based on the presented system of indicators, it is possible to assess the quality of any cargo transportation and determine the effectiveness of the transport process.

Appendix 1 shows the Ishikawa diagram of factors that affect the quality of transportation.

According to the well-known Pareto principle, among the many potential causes (causal factors, according to K. Ishikawa) that generate problems (consequences), only two or three are the most significant, and their search should be organized.

For the factors affecting the quality of transport identified as a result of the construction of the K. Ishikawa diagram, it is necessary to calculate the priority number of risks (PNR). (Kiran 2017)

In accordance with the methodology, each factor is evaluated by an expert on three criteria in accordance with the recommended score scales:

- significance (S)
- probability of occurrence (O)
- probability of detection (D)

After receiving expert estimates S, O, D, calculate the priority

number of the risk of PNR according to the formula:

$$\text{PNR} = S \times O \times D, \text{ (Basu 2017)}$$

Based on the results of the calculations, taking into account the specific situation at each enterprise, it is necessary to identify the most significant factors affecting the quality of transport.

After that, with the help of known means and methods of control actions, it is necessary to propose measures to minimize the influence of these factors (corrective and preventive actions).

6.3 Calculations

This chapter will cover the financial components of the plan. The full cost of implementing the plan, and the approximate payback period.

Thus, we passed to the second round of the tender for the supply of crushed stone. From that moment on, the company and the staff have a sense that they can do more than they are doing now, it is especially important when the team has ambitions and self-confidence. After the victory in the first round, the director together with me discussed specifically the further action plan. I was able to convince him that even if it is not possible to win a specific tender, the development of automotive logistics into the existing logistics of rail will lead to profit, because there are a lot of non-ore resources in the country and not so many conscientious and responsible carriers. STL has received several diplomas and certificates of distinction in railway transportation and having the customer base and it is "about ideal", because STL does business specifically with customers, while other carriers are accompanied by freight forwarders, which lowers the rate for transportation and reduces the value of the carrier. Any customer wants to cooperate directly with the carrier, because there are fewer connecting links, which in turn cannot honestly and correctly perform their duties, and because of this it becomes much more difficult to achieve compensation for damages, and it is

easier to face problems like - not on time delivery, loss, contamination of cargo and a lot of other troubles.

To complete the plan, we will need to research and calculate the following:

6.3.1 Amount of transport needed

The results of analysis allow to draw some particular conclusions that are of interest to the study: it is worth starting with the fact that at least 6 dump trucks should be leased, this figure is not taken for nothing, the reason will be explained below. Firstly, according to the calculations given in the table 4 page 21, it is possible to say that this number is optimal for obtaining maximum profit and further payback from the equipment, taking into account the company's assets. Secondly, exactly this amount of dump trucks is enough to ensure that no car is idle and there are constant traffic movements for exactly for the order of the DSU-81, the idea is presented below in the figure 5:

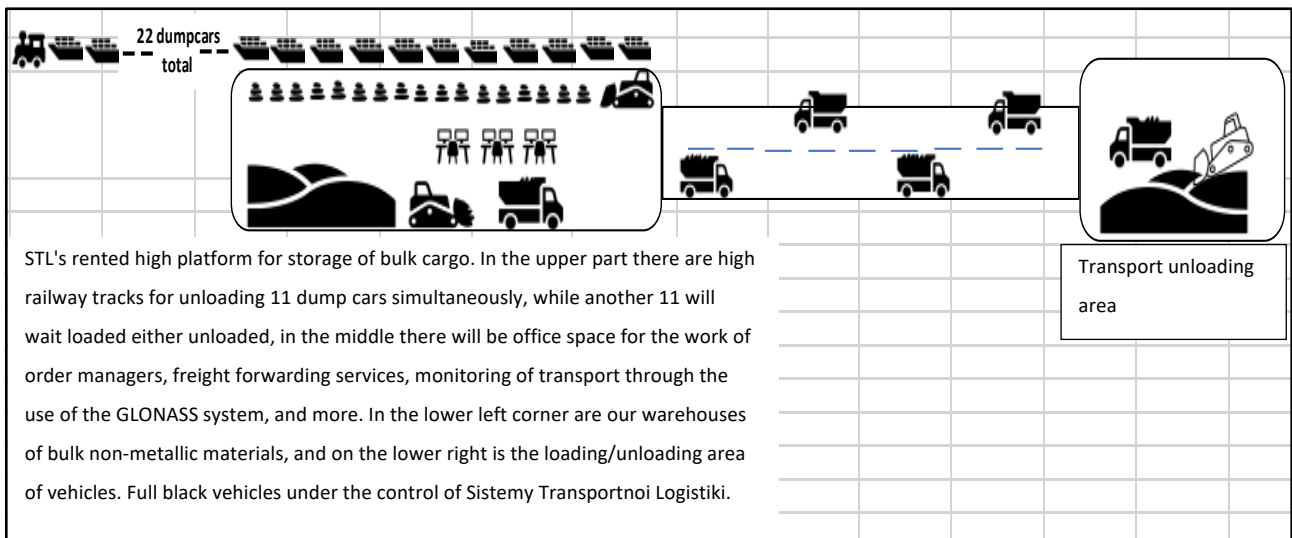


Figure 5. General illustration of the operation of road transport and storage areas

Analyzing the content, procedural and motivational aspects of this implementation plan and specifically the leased site with specific values of variables for the existing order, we come to the conclusion that it is advisable to lease specifically 6 dump trucks, because if there are more of them, it will be demurrage, which is the main disadvantage when buying, renting or leasing transport. Secondly, the equipment for loading / unloading bulk cargo with a front bucket can be leased in the

In figure 6, there is detailed calculated data on the costs of one dump truck for the entire period of work on this order. Here it is clearly shown that due to the huge mileage for 7 months, the biggest expenses out of the variables will be the cost of - dump truck and its fuel costs and salaries for drivers. Fuel occupies the highest position and has 81.17% of the total cost, and the salary of drivers takes 13.87%, in total, only these two indicators together are 95.04% of all costs for one dump truck for the whole period of the order. It is necessary to clearly follow and make the organization of work in compliance with safety regulations, timely technical inspection, and if needed (very little chance that something goes wrong, because all the transport is going to be totally new, will be insured and under warranty) - repair of the fleet of vehicles.

In the best case, we are waiting for the sum of all costs for 6 dump trucks for a specific order from DSU-81 in 15 908 484,00 million rubles.

6.3.3 Merry-go-round dumpcars costs

“Merry-go-round” is a term for a once-assembled train composition that runs without disbanding and shifting, as a single structure. Plying from the place of loading to the place of unloading and back, on a circular route. Merry-go-rounds fill out a large volume, and if it is needed to fill out a small area, for example, a switch, it is preferable to use a single car. In our case, the use of MGRs is required (Wikipedia 2021; STL 2021).

22 dumpcar for the 1 merry-go-round					
Order					
Route	Padozero - Vologda-2				
Route time	3 days				
Amount of dumpcars	22 units				
Load capacity of crushed stone per car	67,5 ton				
Total load capacity of crushed stone	1485 ton				
Padozero - Vologda-2 (loaded)			Vologda-2 - Padozero (empty)		
Fixed costs				Fixed costs	
Costs of Padozero-Vologda (type of rolling stock: dumpcars)			27 932,00 P	Costs of Vologda-Padozero (type of rolling stock: dumpcars)	9 310,67 P
Per day, one car bears	1 300,00 P		85 800,00 P	Per day, one car bears	1 300,00 P 85 800,00 P
Cleaning/feeding	10,00 P/ton		14 850,00 P	Feeding/cleaning	10,00 P/ton 14 850,00 P
				Transshipment	120,00 P/ton 178 200,00 P
Total cost			128 582,00 P	Total cost	109 960,67 P
Sum					416 742,67

Figure 7. Merry-go-round dumpcar cost (STL 2021)

All figures and numbers are taken on the basis of estimated calculations by the financial department of STL, as well as on the basis of open data on the web resources of Russian Railways used by STL, which is not available to regular unregistered users. In total, the need for the supply of 102 such MGR's turned out to be necessary.

This Figure 7 on page 40 shows all the costs and information about the cost of cars in the merry-go-round. The cost of the empty way is 3 times cheaper. All loading/unloading services are provided by RZD CJSC. For the cost of services, official sources are taken at prices by Russian Railways, on the Russian Railways website. In principle, the movement on the railway can be called as simply giving money for services, the only meaning is that a limited number of people with special permits can use these services. Also, the route must be calculated as accurately as possible by the route planning department, so not to lose any wherewithal.

In the best case, we are waiting for the sum of all costs for total merry-go-round with 22 dumpcars for a specific order from DSU-81 in 42 507 752,00 million rubles.

6.3.4 Leasing costs

As it was mentioned earlier the first instalment for transport in all cases is exactly 20%, then all the figures were calculated electronically by calculating the cost of leasing on the official websites of distributors. In all cases, the car is registered to the lessee and all tax charges are included in the rate for the monthly fee under the contract. The result is the following:

1 421 372₽ down payment for a dump truck	1 579 876₽ down payment for loader
101 781₽ Monthly payment for a dump truck	113 123₽ Monthly payment for loader

Next, we calculate the required number of contributions in connection with the leasing of 6 dump trucks and 2 loaders. For clarity, the table 8 presented below:

Table 8. Lease payments (MAZ 2021; XGMA 2021)

6 dump trucks	2 loaders	
8 528 232,00 ₺	3 159 752,00 ₺	First instalments
610 686,00 ₺	226 246,00 ₺	Monthly payments
12 803 034,00 ₺	4 743 474,00 ₺	Total order leasing payments
<u>17 546 508,00 ₺</u>		Sum of payments

It would cost STL for the 7 months period for a total of 17 546 508,00 rubles.

In the future, after the current seven-month contract, the obligation to pay for another 4 years and 5 months will remain, after that, all transport will become the property, although by this time it will be necessary to think not only about the possible expansion of the vehicle fleet with a successful implementation that brings profit, but also about replacing the existing transport on a new one.

However, the reason why the vehicle leasing was chosen, rather than rent or loan, will be presented below. In fact, leasing is a purchase deferred in time, when taxes and the costs of servicing of the car fall on the “shoulders” of the leasing company. Since we chose leasing, let's talk specifically about its advantages and of course not the less important negative parts of this choice, to be prepared for them in advance:

- | | |
|---|---|
| <ul style="list-style-type: none"> + All payments that need to be paid during the entire lease agreement are known + Low initial costs + No additional collateral required + Possible replacement of equipment + Registration, insurance, maintenance of transport is carried out by the leasing company | <ul style="list-style-type: none"> - Higher total cost - Transfer of the right to transport only at the end of the lease agreement and purchase of transport at the residual value - Lease term of at least one year - If the payments are stopped, the lessee will part with both the received property and the money already paid |
|---|---|

6.3.5 Crushed stone costs

It was decided that the loading and purchase of crushed stone will be made from “Chevzhavar” quarry, which is located 3 kilometres away from the railway station “Padozero”. This decision was based on the rationality of interaction with “STL” partners and also in connection with the pricing policy of “Russian Railways” and “STL”.

980₽ rub/ton - that’s the cost for our company for the crashed stone fraction 25-60. Being in close relations with the quarry administration, we have already managed to agree on the impressive cost of a ton. Thanks to this particular move, it will be possible to save about 3 million rubles on the purchase of crushed stone. As we already counted - dumpcar can take 67,5 ton, thus it will cost 66 150 ₽/wagon, then we have 2 240 wagons to do the order and all in all, total price for crushed stone will be: 148 176 000,00 ₽

6.3.6 Calculation summary

Of course, this travel time depends entirely on weather conditions, traffic jams, and other factors. In fact, the solution with traffic jams can be said to be completely solved by choosing not the shortest path, but this will play into our hands. The path is shown below in figure 8. Red point is a starting place – Okruzhnoe shosse, this is a street on which there is a bulk cargo storage area of interest to the STL company for the rental. A black one is a finish place - the place specified in the shipment request:

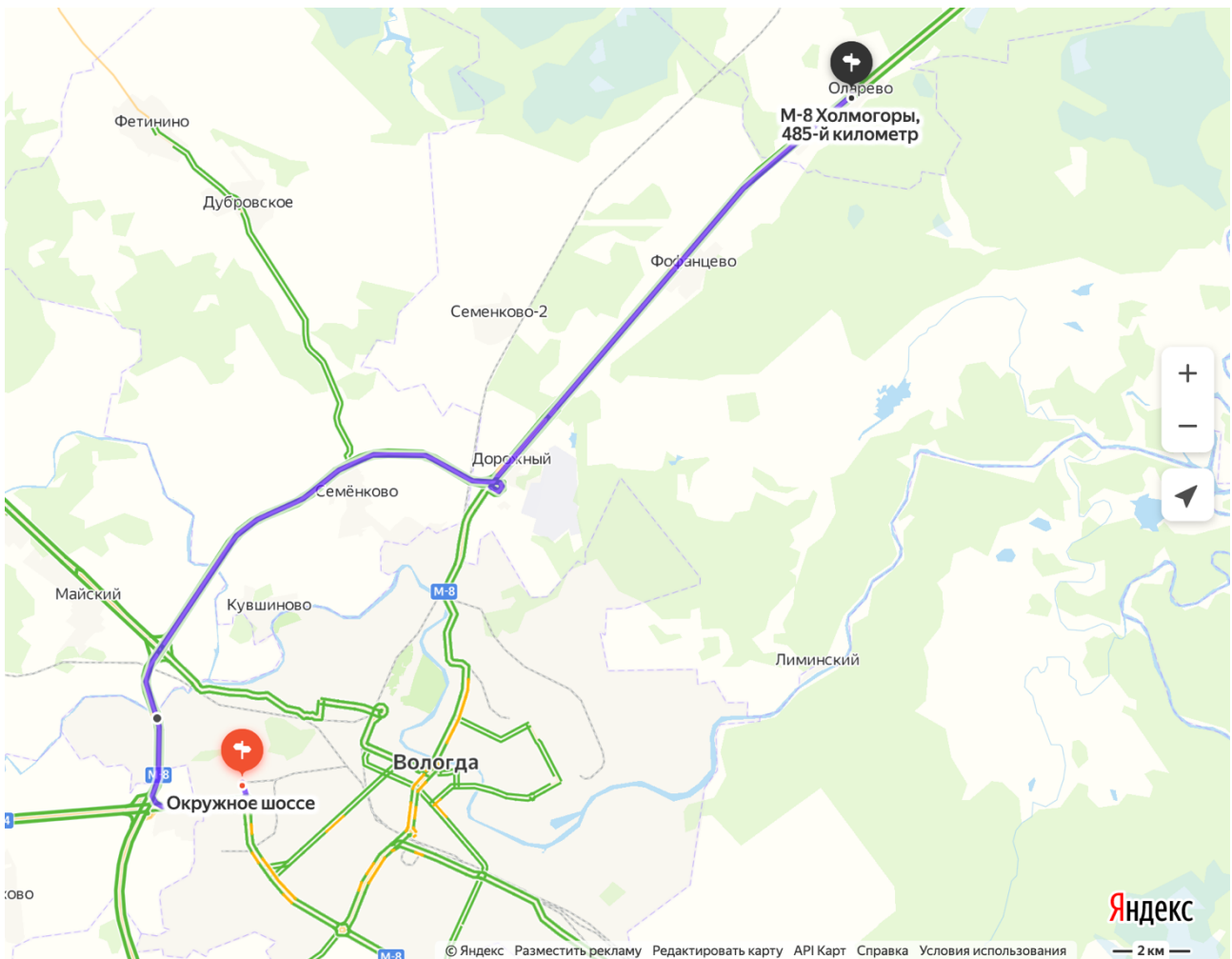


Figure 8. Dump truck route for order of DSU-81 (Yandex maps 2021)

Using a bypass route, it is possible to save on fuel, travel time from the point of departure to the point of unloading. In addition to the negative increased mileage in everything else, we have a large saving of other resources, so I want to say that this is the most optimal way, and it is even worth mentioning that the depreciation on urban traffic can say bad on the gearbox, clutch, brake system and suspension.

The cost of renting a site per month is 100 rubles/m², the STL company should have enough 5000m², this is the optimal one, because with counted area of crushed stone hills for the 5 meters high and length and width for at least 15 meters each (approximately 3 hills would be on the site), and also the fear of losing money on unused areas disappears. Monthly it will cost for STL

500 000,00₽, and for the full order renting of the area with high place for unloading of dumpcars will be 3 500 000,00 ₽

It would also be relevant to pay attention to the weighing of transport. For economy and general development, maybe several scales for dump trucks could be bought in the future modernization, because any overload will lead to huge losses both from fines and from the depreciation of equipment. Still, it is better to start with buying one of them.

Scales for small cargo traffic with the following characteristics:

- maximum load: 20-60 tons
- Platform length: 2.5-12 m
- Division price: 10-20 kg
- The cost of scales: 242 000,00 rubles

What exactly are these mobile scales good for? Benefits are:

- Do not require preparation of the base and installation
- Height 12cm-convenient for the arrival and exit of any car
- The ability to order any length from 2.5-12 m. Track width 0.8-1 m.
- Get ready for work in 10 minutes, quickly relocate
- It is possible to work in the mode of axial weighing (technological weighing)
- Performed and comply with GOST (stands for Standard norm of Russian Federation)
- Entered in the State Register of Measuring Instruments
- Possibility of leasing purchase

To sum up, let us calculate the total costs, the total amount given for the future order, and further calculation of profit or loss:

Scales costs + Crashed stone costs + Merry-go-round costs + Dump truck costs + Leasing costs + Area costs = Total costs

242 000,00 + 148 176 000,00 + 42 507 752,00 + 15 908 484,00 + 17 546 508,00 + 3 500 000,00 =

227 880 744,00 million rubles will be spent during the contract fulfilment.

240 456 333,00 million rubles will be given by the client. A 50% prepayment is given for the order, the remaining half is credited to the carrier's account within 3 calendar days after the last dump truck was shipped.

From the above, we conclude that the work done is expected to be not just done without loss, but also with a profit of almost 6%. So, the profit should be approximately **12 575 589,00** million rubles already with all the expenses related to the purchase of a new type of transport, rent, leasing costs, loans and other already calculated!

Unfortunately, a huge amount of money will be spent on the first installments for transport, but nevertheless, in the following orders, the profit will be significantly higher, because of the leasing costs will remain only monthly payments, which are not the main problem costs.

7 Results of the introduction of a new automobile division

Thanks to the integration of a new division, there are many new offers to customers and many new areas of service "STL" can provide. With such a composition of vehicles and with a minimum order of 360 cars per month, this is how many can be under not the most ideal conditions when loading only half of the available fleet capacity and personnel opportunities of "STL". For one dump truck, we decided that the net profit per month when working 25 days in two shifts and running 10 000 km should be 300 000-350 000₽ - this is net, minus everything (maintenance, driver salary, fuel, accommodation, leasing, etc.). At this rate, all this is still somehow profitable. Salary of a mechanic, accountant, etc., office rent, all this is considered to be approximately 200 000 – 250 000₽. Revenue per month for per dump truck should be 750 000 – 800 000₽. However, these are planned indicators (mileage, salary, revenue, maintenance), they do not always coincide with reality unfortunately.

In fact, it is expected that trucks will make an average of 576 car trips per month (this is 80% of the maximum load). The presented calculation makes no mistake, because according to existing orders and observations of similar transport companies in other non-monopolized north-western regions of Russia, it is expected that the load of the transport company in the presence of 6 dump trucks will be at least 80% -85% per month, at an ideal time, for example, with an existing order

for the supply of crushed stone on the M-8 highway, the constant maximum possible load of our vehicles is expected within 7 months. Such indicators were achieved thanks to an accurate calculation based on the available data of the customer, the carrier, the use of open sources, literature, as well as on the experience and mistakes of other transport companies.

7.1 Implementation plan

Also, a plan was created to complete the task. Based on the available knowledge and individual indicators, it was possible to optimize and simulate the implementation of the task. It is shown below that in the 225 days established under the contract, our company will have enough time to successfully complete the task for the supply of crushed stone. The days of the month highlighted in green have 30 calendar days, while the normal fill is timed to 31 calendar days in the month. Moreover, the following Table 7 - "Plan for the order" shows 7 columns that characterize the following:

1-The number of days in the month and their location in the plan

2-Full number of days to simplify planning and simulation

3-Total number of tons transported by merry-go-round

4,5,6-A tables belonging to a specific merry-go-round (as the simulation shows, we will need three such MGRs for our work)

7-Total number of tons of crushed stone transported by dump trucks

For convenience, the plan was shortened by two intervals from 1-23 days and from 192 to the last 225 days, and also for convenience, each of the three MGR is indicated in its own font: italics, bold and underlined. For the calculations on tonnage and other data provided on the number of MGR, the specific data and transport specifications presented above were taken. Own observations and special studies in this regard have shown that merry-go-round dumpcar wagons can be refused in 22 days before the deadline. All in all, the plan for the order is shown in the table 9 below:

Table 9. Plan for the order

1	2	3	4	5	6	7
Day in a month	Total days	Merry-go-round load	First MGR	Second MGR	Third MGR	6 dump trucks FTL
Day 1	1	<u>1 485,00</u>	<u>1,00</u>			696,00
Day 2	2					1 392,00
Day 3	3	<u>2 970,00</u>		<u>2,00</u>		2 088,00
Day 4	4					2 784,00
Day 5	5	4 455,00			3,00	3 480,00
Day 6	6					4 176,00
Day 7	7	<u>5 940,00</u>	<u>1,00</u>			4 872,00
Day 8	8					5 568,00
Day 9	9	<u>7 425,00</u>		<u>2,00</u>		6 264,00
Day 10	10					6 960,00
Day 11	11	8 910,00			3,00	7 656,00
Day 12	12					8 352,00
Day 13	13	<u>10 395,00</u>	<u>1,00</u>			9 048,00
Day 14	14					9 744,00
Day 15	15	<u>11 880,00</u>		<u>2,00</u>		10 440,00
Day 16	16					11 136,00
Day 17	17	13 365,00			3,00	11 832,00
Day 18	18					12 528,00
Day 19	19	<u>14 850,00</u>	<u>1,00</u>			13 224,00
Day 20	20					13 920,00
Day 21	21	<u>16 335,00</u>		<u>2,00</u>		14 616,00
Day 22	22					15 312,00
Day 23	23	17 820,00			3,00	16 008,00
Day 9	192					133 632,00
Day 10	193	<u>144 045,00</u>	<u>1,00</u>			134 328,00
Day 11	194					135 024,00
Day 12	195	<u>145 530,00</u>		<u>2,00</u>		135 720,00
Day 13	196					136 416,00
Day 14	197	147 015,00			3,00	137 112,00
Day 15	198					137 808,00
Day 16	199	<u>148 500,00</u>	<u>1,00</u>			138 504,00
Day 17	200					139 200,00
Day 18	201	<u>149 985,00</u>		<u>2,00</u>		139 896,00
Day 19	202					140 592,00
Day 20	203	151 470,00			3,00	141 288,00
Day 21	204					141 984,00
Day 22	205					142 680,00
Day 23	206					143 376,00
Day 24	207					144 072,00
Day 25	208					144 768,00
Day 26	209					145 464,00
Day 27	210					146 160,00
Day 28	211					146 856,00
Day 29	212					147 552,00
Day 30	213					148 248,00
Day 31	214					148 944,00
Day 1	215					149 640,00
Day 2	216					150 336,00
Day 3	217					151 032,00
Day 4	218					151 728,00
Day 5	219	EXTRA	EXTRA	EXTRA	EXTRA	EXTRA
Day 6	220	EXTRA	EXTRA	EXTRA	EXTRA	EXTRA
Day 7	221	EXTRA	EXTRA	EXTRA	EXTRA	EXTRA
Day 8	222	EXTRA	EXTRA	EXTRA	EXTRA	EXTRA
Day 9	223	EXTRA	EXTRA	EXTRA	EXTRA	EXTRA
Day 10	224	EXTRA	EXTRA	EXTRA	EXTRA	EXTRA
Day 11	225	EXTRA	EXTRA	EXTRA	EXTRA	EXTRA

As it is seen from table 9, the results of analysis allow to draw some particular conclusions that are of interest to our study: this is undoubtedly the amount of necessary MGR, then we clearly understand how many tons on what day should be transported (this will help to track the successful implementation of the plan for the entire period of the contract). If we go ahead of schedule, it will be possible to issue a weekend for workers or incentives, or to finish the contract earlier and show the customer and the market that we are conscientious carriers, thereby moving to larger contracts. On the other hand, if you notice a delay in the implementation of the plan, you will need to increase the amount of work and take drastic measures to prevent non-compliance with the schedule.

Naturally, these are calculations made under ideal conditions, without taking into account breakdowns, delays in loading and unloading, unforeseen road circumstances, full employment of staff without sick leave and other things. Therefore, this is a very good indicator that there are as many as 7 days left for unforeseen delays. At the same time, it should be emphasized that when meeting the deadline or ahead of schedule, the customer rewards the carrier with privileges in future orders and a certificate

8 Conclusion and proposal

Everything will happen with the new logistics department in the following orders:

- **In the case where only road transport and our cargo are needed (the warehouse is replenished to the volume of total bulk cargo by $\pm 2500\text{m}^3$):**
 1. Dispatchers receive an application
 2. Dispatchers make a full calculation for the delivery of bulk cargo required by the client
 3. Dispatchers confirm the application with all delivery and payment terms
 4. Dispatchers send the driver for loading
 5. STL load the dump truck using our loader
 6. The driver is sent in the direction, as a rule, no more than 125 km in one direction.
 7. Unloads and returns to the base either for the next load, or to the parking lot.
- **In the case where only road transport and the client's cargo are needed (removal of bulk cargo from the client's point):**

1. Dispatchers receive the application
 2. Dispatchers make a full calculation for the delivery of transport required by the client
 3. Dispatchers confirm the application with all delivery and payment terms
 4. The driver on the dump truck goes to the loading point, within Vologda and the region (50 km)
 5. Submerges and goes for unloading within Vologda and the region (50 km)
 6. Unloaded and either sent for the next load, or to the base for parking
- **In the case where a full range of services from loading cars to unloading our cars are needed:**
 1. Dispatchers receive the application
 2. Dispatchers make a full calculation for the delivery of bulk cargo required by the client
 3. Dispatchers confirm the application with all delivery and payment terms
 4. Load the wagons at the desired quarry
 5. Wagons are sent to our site for transshipment and storage of cargo.
 6. Transshipment and distribution of bulk non-metallic materials on the site
 7. STL send the driver for loading
 8. STL load the dump truck using our loader
 9. The driver is sent in the direction of the customer
 10. The truck is unloaded and returned to the base either for the next load, or to the parking lot

8.1 Inference and thoughts

In conclusion, I would like to note that the company, even if the introduction of a new department of automotive logistics does not go according to plan, STL should start using at least the KPI, because based on the research done, the following conclusions can be drawn from the experience of another transportation company interviewees.

The purpose of the thesis was the need to justify the introduction of the automobile division in the field of logistics of the transport enterprise Sistemy Transportnoi Logistiki which was focused before only on railway transportation. Moreover, it was necessary to confirm the feasibility of a complete renovation of the company's services, as well as to provide a detailed report and calculations on the relevance and profitability of the renovation. According to the results of the study, the following conclusions were obtained:

-the basic concepts related to the system and organization of transport logistics of the enterprise are studied. Despite the wide variety of interpretations of the basic concepts, it was concluded that the study will use interpretations of such definitions as: logistics, transport logistics, system, road transport, warehouse logistics and transport logistics system.

-a detailed description of vehicles and their costs is presented, and the most advanced model of cargo transportation for a specific order is demonstrated.

-recommendations on the implementation of KPI are presented.

-after considering the Russian Federation market for automobile logistics of crushed stone deliveries, it was concluded that entrepreneurs can count on support from the state, for example, when buying domestic transport, moreover, the roadways of non-central regions are gradually being developed and modernized, so the work promises to be constant and it is possible to follow the trend of state plans, move the rolling stock and rent new sites for transshipment of bulk cargo in the future with the continuation of road construction in more remote cities of Russian Federation. Urban planners are constantly issuing new orders for the renovation or construction of new roads and bridges. Thus, a lot of crushed stone should be used in these orders, moreover not everywhere there are quarries for the extraction of crushed stone, and even more so, not everywhere there is a railway connection. Although it also happens that there is only a railway connection, and from the final station there is some road, not necessarily paved, it just could be passed by graders and it has a solid ground. Therefore, it will be possible in the future to think about the transportation of dump trucks by rail to remote parts of Russia, to which it is also necessary to deliver crushed stone for construction and updating the infrastructure.

-implementation of the GLONASS software product in the enterprise, allows to track the location of the vehicle on the way. Due to the introduction of this product, the organization has the ability to track exactly where the vehicle is located, whether it does not make any planned movements.

8.2 Advices

In advance, it is mandatory to think through the event aimed at organizing strict control over compliance with the regime of saving on the expenditure of material and monetary funds. This problem can be solved by applying progressive fuel and lubricants consumption standards. The value of technical and operational indicators determines the level of performance of rolling stock, the cost of transportation of spare parts, automobile tires. At the same time, measures are needed to eliminate mismanagement and loss of material assets.

Every driver before the departing must weigh the transport, it is important that the load on the axle is not more than 11,5 tons (Resolution of the Government of the Russian Federation 2011).

Using the formula load per axle (L_a) is equal to full load/number of axles (Tahocard 2021)

L_a of MAZ FTL = $45\ 000/4=11\ 250$ tons per axle. This means there would not be any fines if we will load not exactly 29,5 tons, there is 1 more ton in reserve.

One of the most important tasks of the technical and economic planning staff is to carry out activities aimed at organizing the mode of saving material and money. This can be achieved by saving fuel. Fuel economy is achieved by implementing the following measures:

- reduction of rolling resistance. To do this, it is necessary to adjust the brake systems, maintain the air pressure standards in the tires, regularly check and adjust the convergence of the front wheels of cars and the angles of their installation, timely and regularly lubricate and adjust the wheel hub bearings, apply lubricants, then the car will move by inertia and have a good run-out.
- use the fuel that is installed according to the design of the engine and the time of year.
- monitor the engine cooling system, prevent overheating and hypothermia.
- use fitted covers on the radiator lining and on the hood of the car to insulate the engine.
- do not allow the engine to operate in excess of the standards for toxicity and smoke content of exhaust gases, as well as at high idle speed.
- do not allow fuel to leak from the fuel lines and its evaporation through the loosely closed fuel tank necks.

This will help to reduce the waste on the largest part of the costs associated with transport.

Every driver working in the “STL” must have all the knowledge of economical driving, reduce the engine idle time, including to warm it up before driving, know and adhere to the fuel consumption standards, and in case of overspending, promptly inform the technical and economic planning staff. When identifying vehicles that use fuel in excess of the standards, take the necessary measures to prevent such incidents. Moreover, every driver must comply with traffic laws so that the company does not have an Emergency Risk Surge or Heavy Lift Charge.

Empirical research has shown that with the introduction of a new range of services, “STL” can make a profit and stop being intermediaries. With close cooperation directly with customers, there is maximum benefit for companies such as our customer and (in the future) “STL”. When working directly with the carrier, customers get a huge benefit. First, there is no need to overpay for freight forwarders with attracted transport, because as a rule it will be more expensive due to the retention of the interest of freight forwarders. Moreover, when working for government orders, or even private, but very large firms - reputation plays a crucial role in choosing a service provider. Due to the fact that the “STL” company has been engaged in the transportation of crushed stone and other bulk materials for several years, during this time at the quarries of various parts of the Russian Federation, it has opportunities to benefit from the procurement of a large volume - from 75 000 tons of cargo, and for the attraction the attention of customers, we can play on lowering the rate, which will also play into the hands of competition with another supplier.

8.3 Sum up

Summarizing all of the above and data studied, it is seen that at the current stage of economic development of the Russian Federation, especially the Vologda region, road transport of bulk materials is of particular relevance for improving and introducing to existing transport companies. The result of improving Sistemy Transportnoi Logistiki's transportation management system is to increase the level of the domestic market of bulk materials transportation by the main indicators (delivery time, type of rolling stock, the ability to provide the necessary services and their cost, the exact execution of all necessary actions in the contract and the rhythm of transportation).

In this regard, the goal of the work was defined as the Implementation of the new automobile logistics division in a transport enterprise “STL” based on the development of a system for managing

new vehicles, flows and practical recommendations for the introduction of new department. The introduction of new services in the transport company will ensure the opening of a new market for work; obtaining new assets in the company's account; with a leased warehouse, it will be possible to have cargo available on a permanent basis, thereby providing cargo to the client without waiting, as it was before without the presence of a warehouse; a stable position of the transport company in the market.

The planned annual economic effect of the measures carried out is at least 30 million rubles, which is achieved by delivering bulk materials from the quarry to the final consumer through delivery by rail and then by dump trucks. Without the last stage, the income is almost half as much. For just the first seven-month order with all the costs for the first instalment under the lease agreement, it will be earned approximately the same amount as was earned in 2019 for three orders for the supply of crushed stone only by the railway. The payback period is one order, which indicates the highest economic efficiency of the proposed program of measures, since the payback period does not exceed a year.

The results are accurate to the hundredth only thanks to the research method. The chosen empirical study, as promised, used a lot of documentation, a lot of sources, and also a large number of mathematical, engineering, and logistical calculations. It is guaranteed that the results obtained would be successfully implemented with the same results if it goes underestimated conditions, under which all the data were considered, even taking into account that the actual transport indicators were taken, and the advice of other transport companies was also used, the results are about real ones.

In the topic, there is a need to think about the conversion of vehicles to gas fuel, which was not provided for in my study. However, it is also worth considering the option of switching to a purely green style of work. In Russia, companies are now starting to work with environmentally friendly partners. For example, most of the Russian plants are trying to cooperate with environmentally friendly carriers only, and these plants even encourage this type of work, the profit differs from ordinary companies by about 20%, respectively, if the participants receive a million when working with a diesel transport, then green companies will receive 1.2 million rubles, that is a lot for a transportation company, in addition there is a fuel economy.

This research and results should convince Sistemy Transportnoi Logistiki's director of the need for implementation and that it worth to realize in the summer / spring the proposals in the thesis, starting with the preparation of the lease of the site, because all the related things, such as transport, will not be able to exist without a site with parking at least. Moreover, it is also important to find drivers for your transport and configure their interaction with cars, the GLONASS system, and more. Also, at the beginning, it is worth trying to transport bulk materials, on private orders in the Vologda region, such as delivery or collection of bulk materials from a suburban area or removal of construction waste, in order to adapt to the market and learn a city, new prices and a new method of work.

All in all, in the course of the thesis, the goal of the bachelor's work was successfully achieved by solving all the tasks. Further decisions are expected from the CEO and founders of the "STL" company.

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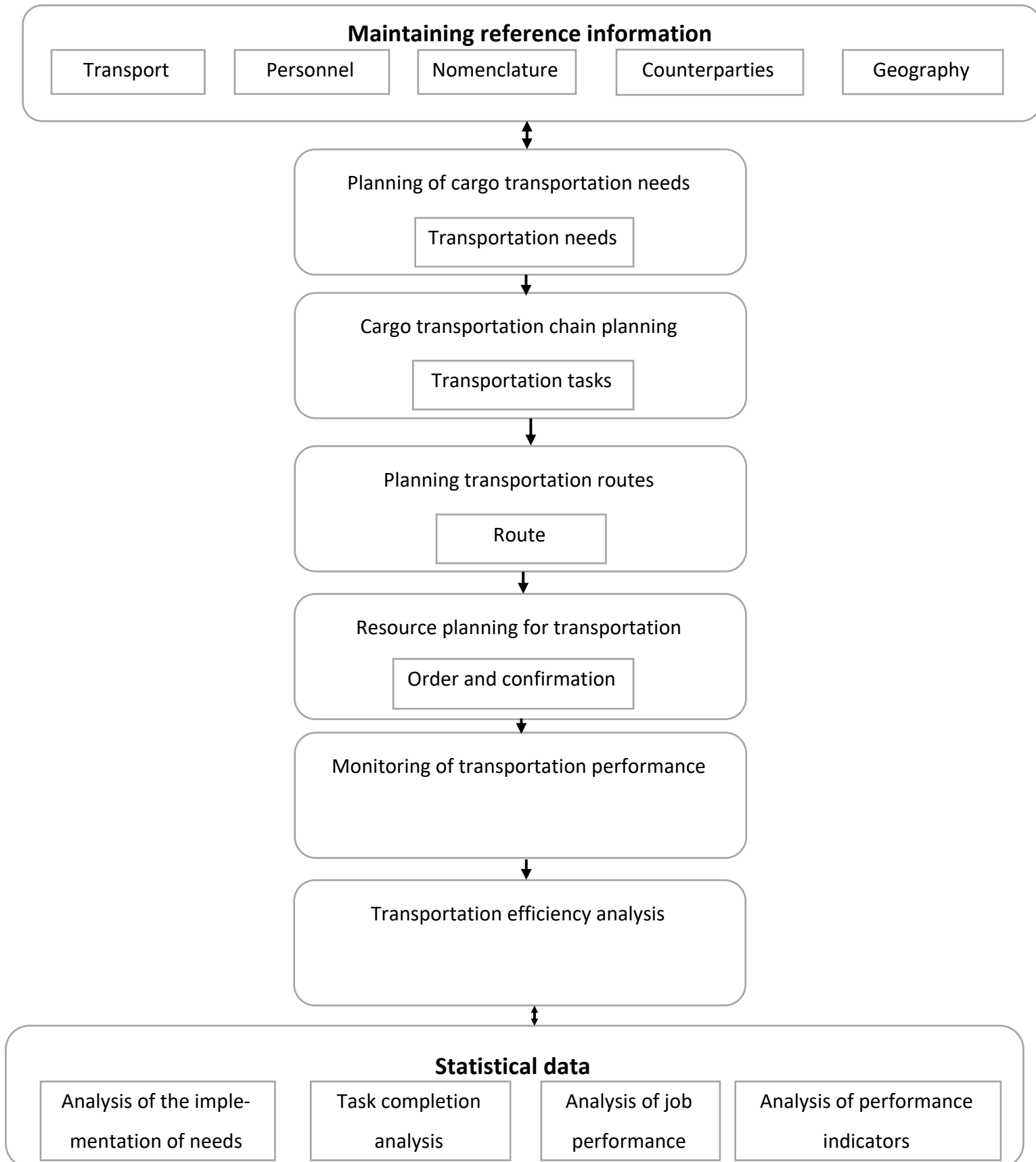
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Appendices

Appendix 1. Information system functionality in the form of an Ishikawa diagram



Appendix 2. Questionnaire

3 different participants from different transportation company were polled

Number	Question	Answers
1	What is the most financially costly part of owning a dump trucks in your company?	Fuel, driver salaries, and insurance deductions
2	How much does the actual fuel consumption differ from the manufacturer's stated figures?	The manufacturer claims that the fuel consumption is somewhere 15 litres less than the actual one, although it is impossible to make claims, due to the fact that the operating conditions are very different from the ideal ones
3	Which dump truck to buy imported or own production?	It is definitely better to buy of our own production, because it has less tax duties, the cost is generally lower. Also, domestic dump trucks are usually more unpretentious and easier to maintain
4	What should we pay the most attention to when buying a dump truck?	When buying a dump truck, it is necessary to take into account the type of work of the body (with forced unloading or tipping), the load capacity of the machine, its capacity. An important role is played by the price and the name of the manufacturer

5	What should we pay attention to when working with new drivers?	According to statistics, one driver a month steals fuel for at least 5 000 rubles, if there are two of them - multiply by two and so on. This is the minimum. For accounting, you should issue a fuel card and have your own gas station or at least large-volume canisters for refueling.
6	Your suggestions and tips for our plans?	All advised to rely more on large orders, rather than on some single deliveries. Of course, with an increase in the composition of vehicles, it will be possible to expand the range of services, but first you should earn customers and work together with drivers, transport and the idea of work