

ABSTRACTS

Session: Logistics

Ksenia Berezovskaya, Olga Krainova
HSE University, St. Petersburg

Abstract title: "JIT concept in the multimodal passenger transportation"

Background: There are a lot of discussions about the multimodal services in the trucking industry. However, there was not much information found on the topic of passenger multimodal transportation. Therefore, in this research we are going to emphasis on the usage of multimodal services in the passenger transportation.

One of the major principal for developing multimodal passenger transportation is the "Just in Time" (JIT) model. JIT is a concept of transferring a required amount of passengers at a required point of time to specific locations. There are a lot of benefits of JIT model.

The multimodal transportation is developing rapidly around the world however in Russia these practices are not widely implemented. That is why the research is up to date and has significant meaning for organizations and its clients.

Research question: How can the multimodal transportation based on the JIT model influence transportation company's performance?

The report will be presented with co-author Olga Krainova.

Method of collecting information: Analysis of the secondary sources. On this stage of the research we need to evaluate the results of the statistical data such as dynamic of the passenger turnover, passenger traffic, specific trends in the passenger transportation industry etc.

Research design: Case studies. We are going to analyze companies that had already implemented multimodal transportation services at least on few of the destinations that they offer

Method of processing information: To calculate the time and cost of the proposed route. To compare this result with the one that company had before implementing multimodal transportation. To evaluate benefits for passengers.

We expect that the implementation of multimodal services into business processes of the passenger transportation company can benefit the organization through lowering the logistics expenses. In addition, this strategy can have a positive impact on the competitiveness of company on the market.

Besides, passengers will benefit from this as well due to they will spend less time on their travel. Moreover, they can save money because they do not need to use several different companies to get from one location to another.

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Dmitrii Petrovskii
HSE University, St. Petersburg

Abstract title: "On classification of failures in the supply chain"

Today, supply chain analysis is getting more and more important in different economical areas. Within the framework of globalization, supply chain becomes more complex and integrated. Thereby, the assessment of the reliability of logistics systems is becoming increasingly necessary. Within such a strong level of integration between the companies, included in the supply chain, even the basic failures can lead to dangerous consequences, causing cascading failures.

Probability of failures occurrence, linked with malfunctions on the different levels of the supply chain, can be reduced by applying theory of the reliability through the business-process optimization. However, the quantity of articles dedicated to the failures types in the logistics systems is limited. Moreover, researchers define the term "failure" in different ways, and at this moment the structured approach of definition and classification of failures is not exist.

In the light of the foregoing, it becomes possible to highlight next research question:

RQ: What kind of failures types in the supply chains can be highlighted?

Based on the works of set of researchers, it is possible to conclude, that approaches, which describes the definition of term "failure" in supply chain, are divided into 4 ways.

- Event type.
- Contract type.
- Definition through the risk management.
- Process type.

Such a wide set of the approaches to the definition of failures in the logistics system complicates their classification.

Event and process types of failures definition, suggest the next classification, which is reflected in the works of such authors as Lukinsky V.S., Lukinskiy V.V., Bochkarev A.A. and others.

1) By type of the logistic flow the failures can be divided into:

- Failures in the material flow
- In the information flow.
- In the financial flow.

2) By patterns of occurrence they can be divided into:

- Random.
- Not Random

3) By probability of occurrence:

- Unlikely.
- Possible.
- Very likely.

4) By the degree of the dependence the failures can be divided into:

- Independent.
- Dependent.

In recent years, interest of scientists to study the cascading failures is increasing. In the set of works the cascading failures, their influence on the system and key factors of their occurrence are discussed. Zeng and Ash give an example of failures classification by consequences through cascading failures.

By consequences, failures can be classified into:

- Light impact.
- Average impact.
- Severe impact.

The classification in terms of risk management is extensive enough, dwell only on the main provisions. As Goldsby remarks, the main types of the risks in the supply chain are: environmental risk, industry risk and organization risk. This set of the risks includes the subsets of more specific risks such as political, social, product market risks, agency, credit risk etc. Except of the foregoing, this classification also includes such a special risks as: risks of task complexity, objectives and constraints, knowledge and skills of employees.

At this stage, approbation process of reliability theory in the logistics is far from complete. Researchers face a number of fundamental issues related to the methodology and terminology, such as the structured methodological basis absence and the low level of communication between the different logistics schools.

Due to sharp differences between technical and economic systems, it becomes too difficult to demarcate various concepts and terms. Moreover, methodological approaches, which have recently appeared, greatly expanded the possibilities of describing of given processes. It leads to a lack of integration between existing and emerging approaches, and to a slowing of structuring methodological basis of reliability theory in logistic systems.

Thus, the existing terminology and classification of failures requires further discussion and a higher degree of unification, which ultimately will significantly improve the quality of reliability evaluation in real-world supply chains.

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Darya Bazhina
HSE University, St. Petersburg

Abstract title: "CONFLICTS RESOLUTION BY IDENTIFYING THE BALANCE BETWEEN TOTAL LOGISTIC COST AND RELIABILITY OF THE SUPPLY CHAIN"

In logistic forming the work plan of each department is based on existing methods of calculation (e.g.: models, algorithms), and acts in accordance with their interests without considering the interests of other departments and a whole organization. Various types of local optimization for conflict resolution are in discrepancy with the principle of global optimization of the supply chain. The analysis showed that there are several directions for solving this problem in logistics. There are two basic techniques within analytical approach: (1) forming of a supply-chain operations reference (SCOR) model (Sergeev; Brodecky & Vinogradov); (2) imitation of conflict process within game theory modeling (Shikin & Chkartishvili; Lefevre). However, ongoing conflicts make researches to study new more comprehensive techniques of global optimization. The research question of this paper is to find possibility of solving conflicts by identifying the balance between total logistic cost and reliability of the supply chain.

In this research we are using the systematic approach to solve the issue of safe efficiency improvement of a supply chain by integration and coordination of different participants and processes. The essence of this method is the following:

- 1) taking into account interrelations of departments and mutual influence, for example, by implementation of the model of total logistics cost (TLC);
- 2) studying each element reflecting the operation of the department; it should be provided on the basis of research approach, longitude analysis of new requirements and their practical implementation;
- 3) taking into account the specifics of logistics systems, the TLC model should be supplemented by restrictions and inequalities for individual model parameters, in particular discounts, etc.;
- 4) respecting the principle of decomposition of the basic model of TLC by different departments of a supply chain, for example, the review of conflict parties using the model of optimal order size EOQ;
- 5) strengthening of the TLC model by reflection the reliability (probability of failure) of the circuit elements.

The essence of the proposed approach consists in finding such parameters of the supply chain, which minimizes the total cost of the organization (global minimum) (Lukinskiy&Bazhina, p. 212-216). Analysis of literature (Bowersox&Closs; Stock & Lambert; Lukinskiy, Lukinskiy&Churilov) showed that the existing total logistics cost (TLC) models include form two (Harris-Wilson model) to eleven components reflecting the main logistic operations: procurement, ordering, transport, warehousing, storage, return flow, etc. (Lukinskiy, Lukinskiy&Zamaletdinova, p. 48-61).

Analysis of the problem shows that just minimizing overall costs is not enough. It is necessary to take into account other quantitative and qualitative parameters, such as level of service, which includes indicators such as quality, reliability, customer satisfaction (perfect order parameters) and should strive for the maximum (Lukinskiy&Lukinskiy).

In addition to the discussed issues the problem of cooperation between different units is very acute. During solving inter-organizational conflicts, in our view, it is necessary to find an optimal balance between cost and quality, within the limitations of the system. Thus, relying on the synthesis methods could lead to optimal management decision that will reduce the cost to a whole organization, without reducing quality.

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Maxim Shestakov
HSE University, St. Petersburg

Abstract title: "The Consolidation of Sourcing Activities Across Non-Competing Companies"

The decline of total purchasing costs can lead to improvement of a company's financial conditions. It should be noted, that total purchasing costs can be decreased with the achievement of the scale effect via the consolidation of purchasing volumes of companies, which demands the integration between companies in the sphere of sourcing.

Scholars juxtapose two ways to consolidate sourcing activities. There are group purchasing organizations (GPOs), which aggregate the demand of their participants, and negotiate contract conditions with suppliers on members' behalf (Blair & Durrance, 2013). Another type of interaction is a joint purchasing agreements (JPAs), which are the horizontal integration between their counterparts (Carstensen, 2010).

The problem of the research is to prove the efficiency of the sourcing activities consolidation of Fazer, an actually existing company, with other companies. The company operates in the industry of bread and bakery manufacturing.

The hypothesis of the study can be formulated as follows: total purchasing costs are lower when companies consolidate their purchasing volumes.

The object of the research is the implementation of consolidated sourcing in Fazer.

The condition of Fazer's integration with other companies in the sphere of sourcing, which was formulated by the company's management, is consolidation only with non-competing companies, so in the study there will be analyzed only the companies outside this industry. The research design of the paper is a case-study. It includes the analysis of the phenomenon from such sides as logistic, microeconomic, financial, legal, organizational and managerial.

Different research instruments were chosen for the exploration of various issues:

- 1) The microeconomic issues which include the evaluation of bargaining possibilities with suppliers will be analyzed with the calculation of the Herfindal Hirschman indexes to measure the power of suppliers. The data source will be Spark-Interfax.
- 2) The legal issues which can be the concern of antitrust law as a result of the consolidation of purchasing volumes will be assessed with the usage of secondary data including the Federal Laws of Russian Federation about antitrust policy.
- 3) The financial issues will be analyzed via the calculation of the relevant costs and the discounted cash flow of Fazer for the implementation of consolidated sourcing in the company.
- 4) The logistic issues will be explored via the assessment of potential risks of the implementation of consolidated sourcing in Fazer's supply chain.
- 5) The organizational and managerial issues which include the choice of appropriate way to consolidate the sourcing activities will be considered via the exploration of the secondary data including the cases of similar companies and the interviews with the representatives of Fazer's sourcing department and the representatives of Fazer's partners.

The analysis of these issues will let to evaluate the expediency of the consolidation of sourcing activities.

As a result of the study, a comprehensive analysis of the issues from the implementation of consolidated sourcing in Fazer and its counterparts will be presented. The first draft will be based on the consolidation of purchasing volumes of Fazer and its counterparts in the purchases of bottled water, taxi and hotel services. These purchasing categories are widespread among the companies of all the spheres of activities.

In the first place, it will include the evaluation of the financial and organizational effectiveness of the consolidated sourcing from the Fazer's side. Secondly, there will be considered the potential risks from both the legal and the supply chain points of view. Thirdly, based on the secondary data, where the two main types of the consolidation of sourcing activities such as GPOs and JPAs were highlighted, it can be possible to choose an appropriate approach for Fazer. All things considered, there will be created the project scheme of the implementation of consolidated sourcing, which will include the description of all the main stages of implementation, the responsibilities distribution among the project team and the necessary resources.

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Catherine Pavlova
HSE University, St. Petersburg

Abstract title: "Saint Petersburg Logistics Infrastructure analysis"

Sustainable regional economic growth depends on many different factors and one of the cores is its security by the infrastructure. The question of infrastructure is quite complicated both for the analysis – because the infrastructure needs to be analyzed as a complex of objects, and for the business infrastructure projects are usually huge investing projects. The object of this research is to conduct a comprehensive Saint Petersburg Logistics Infrastructure analysis.

Methods and instruments of the regional infrastructure analysis which are suggested by different authors researching allow systemizing all existing methods into three groups. The most common method is statistic data collecting and interpretation [1, 5, 6]. Second group of methods is mathematical methods, when authors use normalized figures, calculate correlation between different economical indicators [4, 7]. Thirdly, some authors suggest use of managerial tools, such as SWOT matrix in order to describe opportunities and threats for logistics infrastructure, its strengths and weaknesses. To sum up, it was revealed that most of the authors, who explore this question, focus on the separate instruments, frequently not mathematical but descriptive and do not provide a comprehensive analysis methodology.

To conduct a reliable Saint Petersburg infrastructure analysis 5 analytical instruments were employed:

- formulating core objectives which are solved by Saint Petersburg logistics infrastructure;
- horizontal analysis of statistical indicators characterizing the St. Petersburg transport hub;
- SWOT analysis matrix plotting;
- regression model calculation;
- correlation evaluation.

Firstly, in order to understand the regional specifics were described the social and geographical Saint Petersburg characteristics. Secondly, to reveal the economical tendencies statistical data relatively trucking, passenger transportation, import, export and warehousing were analyzed. Thirdly, as it was detected that growth of gross regional product (GRP) need to be supported by the investments into fixed capital (and regional logistics infrastructure is a part of fixed capital), the correlation between this these two data missives were calculated and the forecasting figures were counting. Then on the base of received data was plotted the matrix of SWOT analysis, which suggests all possible strategies, considering current situation. The last method, which was used in the research, was a correlation analysis and building a regression model, which was employed in order to specify the obtained earlier results. The dependent variable in the model was the value of GRP, the list of independent variables was following:

- x1 – Cargo turnover of the port;
- x2 – Departure of goods by rail;
- x3 – Arrival of goods by rail;
- x4 – freight turnover of motor transport;
- x5 – The number of buses per 100 000 population;
- x6 – Airport passenger traffic;
- x7 – Cargo turnover of air transport;
- x8 – The volume of imports;
- x9 – The volume of exports;
- x10 – The index of industrial production;
- x11 – The volume of foreign investments.

The calculating period was 2007-2014 years. All initial statistical data was got from official regional infrastructure objects (port, airport, etc) websites and governmental statistical digests [8, 9, 10, 11, 12].

Description of the social and geographical Saint Petersburg characteristics allowed to revealed 4 core criteria's which determines Saint Petersburg as a log hub, they are following;

- geographical location;
- active investment process in the consumer sector [2];
- a significant and growing every year, the city population;
- a large number of industrial enterprises [3].

Then were analyzed the socio-economic indicators, and it was discovered that while warehousing infrastructure undoubtedly need to be expanded, the volume of transport infrastructure, according to basic statistic data, is already enough. On the other hand, the calculation of the security of the GRP growth by the investments into fixed assets shows that the substantial GRP growth (about 8% annually) need to be supported by the adequate growth of investments.

Thus, the obtained results are contradictory, so, to identify growth points, the regression model was plotted. By using this method were found of key vectors, namely:

- St. Petersburg large port;
- public transport;
- airport passenger traffic;
- infrastructure ensuring import flows.

Since the use of the list of tools described above led to obtaining reliable and valid results, these instruments can be formalized as an algorithm to analyze logistics infrastructure.

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Nikita Aliaba
HSE University, St. Petersburg

Abstract title: "LOGISTICS CENTERS OF ASIA-PACIFIC REGION"

In the modern world the increasing competition on the market forces production companies to find extra-options of decreasing the product's final cost. Though the most technological and manufacturing scopes are almost exhausted, the logistics component and in particular the transportation elements still might be examined in order to decrease and optimize the costs. The global experience demonstrates that only integrated logistic approach enables to reach the maximum efficiency. By this approach logistics operators and providers provide customers with various logistics services in sphere of promoting and operating the material flows. Logistics centers are one of the possible options, that allow to enhance the efficiency of the existing logistic infrastructure and create the basis for its further development. In terms of global division of labor, the issue of transport infrastructure in Asia-Pacific region becomes extremely acute. The experience of Western Europe shows, that creation of broad logistics centers network can make a substantial contribution to the development of logistic infrastructure, countries' budgeting and overall costs saving of the customers. The research question of this paper is to analyze to which extent the logistics centers system is developed in Asia-Pacific region. In this research the systematic approach is vital in order to analyze a large spectrum of factors and elements that contribute to the efficiency of the logistic infrastructure. There are several aspects which must be taken into account and are examined in this paper work:

- 1) the specifics of the logistics centers as well as regional (geographical), cultural and economic specifics of the Asia-Pacific countries;
- 2) the economic and logistic performance of the countries in Asia-Pacific region
- 3) statistical and empirical data provided by the sea ports and the governments;
- 4) the studies conducted by external organizations such as United Nations, CBRE and etc, which contain vital analytical information and predictions regarding the logistics centers network of the region;

In order to conduct this study all of the previously mentioned aspects are analyzed, so that on the basis of this analysis it could be possible to make some conclusions and predictions.

In the modern global economy logistics centers play an enormous role in the movement of goods and serve as a proof for countries' economy prosperity. On the basis of the three key factors defined by the CBRE's model, which are infrastructure, market demand, and the business environment, eight centers of global logistics in the Asia-Pacific region can be identified. These centers are expected to remain globally dominating in 2030, because they are located along major trade corridors, connected to the main international transport systems, contain large amounts of simple logistics space and have the agglomeration of complex logistics operators. Furthermore, it can be denied that along global logistics centers there is a tendency towards the increasing role of the regional and local centers.

And the last but not the least is that basing on the experience of Singapore and Tokyo we can conclude that a close cooperation of state and private enterprises, and a synergistic effect as a result of it enable to create truly effective logistics systems that link the country with the global trade network and to become a leader in the field of logistic operations.

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Vladimir Volkov
HSE University, St. Petersburg

Abstract title: "THE APPLICATION OF HUNGARIAN METHOD FOR ASSIGNMENT OF SPECIALISTS, PERFORMING LOGISTICS OPERATIONS"

Contemporary manufacturing and trading companies utilize very sophisticated management systems. More than often, the effective enterprises, that owns separate logistics department may face with the problem of duplication of several logistics functions by some other departments. Such kind of problem may cause the intersection of different department's interest and bring provoke an internal conflict. Moreover, unequal salary level of different department's specialist impact on total cost of each logistic operation performing. The present paper is an attempt to find the best way for assigning specialists from different departments that are to be responsible for executing particular number of logistics functions. The theoretical basis of the article founds on researches of such Russian and international scientists as Lukinskiy V.S., Lukinskiy V.V., Taha H, Stock, J.R and others.

The present research is based on the theory of Operation research. Assignment model provides an easy way to find the best solution. The best person for the job" is an apt description of the assignment model. The situation can be illustrated by the assignment of workers with varying degrees of skill to jobs. A job that happens to match a worker's skill costs less than one in which the operator is not as skillful. The objective of the model is to determine the minimum-cost assignment of workers to jobs.)

The assignment model represents a special case of the transportation model in which the workers represent the sources, and the jobs represent the destinations. The supply (demand) amount at each source (destination) exactly equals 1. The cost of "transporting" worker i to job j is C_{ij} . In effect, the assignment model can be solved directly as a regular transportation model. Nevertheless, the fact that all the supply and demand amounts equal 1 has led to the development of a simple solution algorithm called the Hungarian method. (HamdyTaha)

The easy and transparent design of Hungarian method enables to assign specialist for executing necessary logistics operation, by the way of minimizing the total costs. At our case the only information we input, is the information regarding the salary of each worker and the necessary time for performing each logistics operation.

The application of the proposed Hungarian method enables to minimize the total cost for executing logistics operations that assumes the involvement of specialists from different departments. However, even possessing this advantage, the method has a number of disadvantages and drawbacks. First of all it can be applied in a very particular case, when

company has no way to hire extra employees for different departments with a lower salary level. In addition to that the method doesn't take into account the fact the task can be accomplished with different level of efficiency. The last aspect that should be noted for further improvement of the model is the probability of conflict occurrence in case of reassignment.

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Alexandr Barashkov
HSE University, St. Petersburg

Abstract title: "Classification of mathematical models of distribution logistics"

Nowadays, there is an active expansion of logistical approach in management, especially in companies, whose activities are connected with the movement of material flows. One of the most difficult and complex problems in logistics is management of goods distribution system, due to the fact that this problem and, accordingly, models of system should take into account a large number of different factors and interdependencies, which describe how system works and its surrounding environment.

There are a lot of different kinds of models, but many of them are poorly applicable in practice, which points to the need for any extension of these models or search for new approaches to the problem.

The objective of this research is classification and analysis of modern methods and models, which were made to improve logistics management in distribution of goods and manage whole distribution system.

In this research will be analyzed mathematical programming models for logistics distribution. Most of them are from operations research journals and logistics journals, such as *International Journal of Production Research*, *European Journal of Operational Research*, *International Journal*

of Production Economics, Journal of Logistics Management, The International Journal of Logistics Management. Theoretical and methodological basis of the research is the main provisions and methods of basic and applied research in the field of economics, logistics and operations research. Also a methodological basis for the research will provide methods of system and structural-functional analysis.

Expected outcome of this study is competent classification of modern mathematical models concerning the activities of the distribution of goods.

This classification will allow to draw conclusions about the limits of their validity, legality of use in different situations, about the direction in which we can move on this issue.

The main advantage of classification is that based on it will be possible to create methods of logistics management of company or supply chain, which will be adequate to modern economical models and economy as a whole.

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Abstract title: "Evaluation methods of reliability and effectiveness of designed logistic systems"

The aim of this study is the development and improvement of methods for evaluating the reliability and efficiency of designed logistic systems. To achieve this purpose is supposed to solve following problems:

- Analysis of modern trends in the development of the theory and methodology of logistics at the stages of designing and reengineering the supply chain, as well as an overview of research in the field of supply chain reliability theory, including both foreign and domestic works;
- Analysis and systematization of the existing methods and assess the reliability of multilevel models, integrated supply chains;
- Development and improvement of mathematical models of evaluation of reliability and effectiveness of designed logistics systems;
- Description of methodology of information collecting which is necessary for the correct mathematical and simulation modeling in the framework of developed methods;
- Conduction of series of experiments on the basis of the constructed mathematical and simulation models;
- Creation of an applied tool (based on the simulation) for calculation of the strategic and operational reliability;

The object of the study are enterprises and designed logistics system.

The subject of the research is a set of methods and models for evaluating reliability and efficiency of logistics systems.

Theoretical and methodological framework is based on the following tools and methods: fundamental and applied research in the field of logistics and SCM, system analysis, economic analysis, the methods of logical analysis and synthesis, mathematical statistics, mathematical and simulation modeling, etc. It is supposed to use scientific periodicals, monographs, scientific conferences materials, as well as electronic publications.

The main software products are MS Excel (static models), AnyLogic (dynamic simulation models). It will help to conduct tests and experiments of developed models.

It is supposed to get the following findings out of the study:

- 1) Development of applied mathematical model for calculating reliability and efficiency of logistic systems;
- 2) Description of the recommended method of collecting information for evaluation of reliability;
- 3) Development of applied simulation model, which will be built on the basis of a described mathematical model ;
- 4) Development of recommendations for making management decision.

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