ABSTRACT AND REFERENCES

CONTROL PROCESSES

## JUSTIFICATION OF STABILITY RANGES OF COMMERCIALLY REASONABLE, ALLOWABLE LOSS-MAKING AND CRISIS OPERATION OF THE VESSEL (p. 4-10)

**Elena Kirillova**

In the period of unfavorable conditions of the freight market, where the vessel operates with zero or negative profit, the Owner can lay up the vessel or continue its operation. The decision on the vessel withdrawal from operation is usually made based on the results of the CVP analysis («costs-volume-profit»). It is not always justified. The reason is the presence of expenses, accounting of which is not provided by either the CVP analysis or the provisions on the justification of indicators of commercially reasonable operation of the vessel. As a result, the Owner's expenses, related to the operating reserve or cold stack of the vessel may be significant, compared to losses accompanying the continuation of inefficient operation of the vessel. In turn, when deciding on the continuation of loss-making operation of the vessel, the Owner should understand that this cannot last indefinitely, despite the desire to maintain the market share. Consequently, the Owner should be guided by certain operating and financial indicators. At the same time, it is evident that all these indicators characterizing the ineffective operation of the vessel are in the loss-making zone. It was considered in detail in the research. As a result, the zones of allowable loss-making and crisis vessel loading, allowable and crisis loss were identified. The corresponding indicators were proposed, justified and formalized. The ranges of stable commercially reasonable, allowable loss-making and crisis operation of the vessel in terms of indicators of loading, income and expenses were determined.

**Keywords**: vessel, vessel loading, loss-making operation of vessel, stability range.

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## FORMATION OF FUZZY SUPPORT SYSTEM FOR DECISION-MAKING ON MERCHANTABILITY OF ROLLING STOCK IN ITS ALLOCATION (p. 11-17)

**Denis Lomotko, Anton Kovalov, Oksana Kovalova**

The paper proposes a scientific approach to solving the problem of forming the knowledge base and effective support system for decision-making by operational railway employees in the allocation of rolling stock depending on its merchantability.

Analysis of existing regulations has shown the lack of a clear and unambiguous definition of merchantability of the rolling stock in regulatory documents, so contentious issues arise between the carrier and the shipper, especially in the reallocation of the rolling stock for loading. In this regard, almost complete lack of the formalized selection technology of rolling stock for loading was revealed.

The results of solving the problem of merchantability assessment of the rolling stock allow to improve the quality of management decisions, primarily through the optimal use of internal resources, and the proposed solution methods based on fuzzy DSS can be used in conjunction with other control methods. It is important that the presented approach allows a more thorough merchantability assessment of the rolling stock by reducing the uncertainty of this matter in both regulatory, and technological terms. This issue is an integral part of the range of problems that arise when forming the system of logistics centers of Ukrainian railways.

**Keywords**: logistics technology, rolling stock, reallocation of cars, merchantability, decision support.

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## DEVELOPMENT OF THE CONCEPT OF GAME APPROACH TO COORDINATION OF CARGO DELIVERY MANAGEMENT WITH TRANSFER IN GENERAL TRANSPORT NODES (p. 17-24)

**Arsen Muradian**

An approach to forming the optimum mechanism of ensuring the coordinated cargo delivery process management with the transfer in general transport nodes, based on the theoretical and methodological tools of game theories and agreement between the participants of the cargo transportation process under the "door to door" scheme was presented.

The preconditions of the problem of cargo transfer process management in terms of network relationship marketing were considered. The problem of ensuring the coordinated cargo delivery process management in the form of a non-cooperative game with non-opposite interests was formulated. The structure of the network model of relationship organization of the general transport node entities within dual interactions with the multimodal transport operator was characterized. The procedure of dual relationships in the interaction network of cargo transportation and transfer participants was formalized. The law of cargo delivery process management, including transfer in general transport nodes, was substantiated, and the conditions under which there is a stable equilibrium point for the interaction network were determined. The mechanism of coordination of cargo transfer process management, which is a non-manipulable and Pareto optimal was presented in an analytical form. The method for implementing the law of cargo delivery process management in the context of ensuring the «game» interaction of a set of the contacting systems «multimodal transport operator - port/stevedoring companies – railway administration» was developed. The data characterizing the efficiency of introducing this method in the practical activities of forwarding companies were given.

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## RESEARCH OF THE EFFECT OF TERMS AND CONDITIONS OF AN OFFER ON SUCCESSFUL CONCLUSION OF THE FREIGHT TRANSACTION (p. 25-32)

**Svitlana Onyshchenko, Yuliya Koskina**

When forming a complex of the terms and conditions of the contract of affreightment, each party should assess adequately the chances of the conclusion of the transaction and also determine the necessary limits of adjustment of certain conditions in the event of the unacceptability of the base case of terms and conditions. To date, such decisions are made «intuitively», which, firstly, makes the process of conclusion of the transaction longer; secondly, may not provide compromise conditions at all.

The research analyzes the major terms and conditions of offers – bases for the conclusion of the contract of affreightment – as the factors that affect the parties' decision-making on the conclusion of the voyage charter; their formulations are given as advantageous and disadvantageous to the shipowner with regard to their impact on the amount of expenses and possible risks.

Using statistical methods – correlation and regression analysis and nonparametric analysis, the impact of the identified factors was quantified. The regression model, which, with a sufficient degree of reliability, allows to evaluate the success of the conclusion of the freight transaction was obtained. The results of the nonparametric analysis complement findings made on the basis of the regression analysis. Such complex of tools allows to cover the entire range of terms and conditions of the offer having both a quantitative assessment and set in the form of the qualitative characteristic.

Thus, by analyzing a combination of terms and conditions, stakeholders – the broker, the charterer and the sea carrier - can make certain concessions in reaching a compromise, and the proposed tools allow to do such actions reasonably.

**Keywords**: terms and conditions of an offer, freight transaction, voyage charter, shipowner, charterer, voyage expenses, statistical research.

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## DEVELOPMENT OF PROPOSALS FOR INCREASING THE PROFITABILITY OF PASSENGER RAIL TRANSPORTATION IN UKRAINE (p. 33-39)

**Ganna Primachenko**

The current state of passenger rail transportation in Ukraine is investigated to identify the factors of increasing the profitability of the sector. The analysis of the occupancy of passenger cars on various traffic routes of trains and estimation of the passenger number on local and through traffic routes depending on their range are performed. The direct relationship between these indicators used to determine the required amount of the rolling stock is revealed. The approach to determining the potential users of transport products of rail transportation with the help of the cluster analysis method is proposed. This approach is based on identifying the cluster (group) of potential passengers of certain types of rail cars by virtue of the analysis of passenger traffic on different routes using the agglomerative hierarchical classification algorithm. The proposals for improving the financial condition of the sector through the introduction of the transport product of passenger transportation in special passenger cars, including the traffic organization of commercial and special trains, provision of additional transport services, namely using passenger cars as a transport means or a "hotel on wheels", using the enhanced-comfort rolling stock for passenger groups, reducing the rail travel duration due to combining movement and rest, setting tariffs for transportation of passenger groups based on the profit rate are submitted. The cost and quality factors of development of the system of additional transport services on rail transport of Ukraine, with the rail transport acting as a transport mode to deliver passengers to their destinations or as an object of interest for tourists are formulated.

**Keywords**: cluster analysis of passenger traffic, transport product, through rail traffic.

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## PECULIARITIES OF THE TRAIN DRIVER'S WORK IN MODERN CONDITIONS: A VIEW FROM INSIDE (p. 40-45)

**Valerii Samsonkin, Yaroslav Petinov**

The study focuses on peculiar features of the professional activities of the train driver in the present conditions, when the rate of road accidents remains high and the existing traction rolling stock is rapidly "aging", i. e. deteriorating. We have identified new factors affecting the "train driver – locomotive – rail transport infrastructure" system and new trends in the operation of locomotive crews, such as a significant increase in the volume of radio and mobile communication and regular changes in regulatory, reference and official documents, which result in additional duties laid on locomotive crews. The findings allow working out measures that would improve the rate of the railway traffic safety with an account for the current state of the system in which the key role belongs to the train driver. We have identified the current challenges and promising ways to improve the reliability of the human factor in ensuring the railway traffic safety, such as: (1) the necessity to consider individual characteristics of the driver, (2) optimizing the verbal interaction of the locomotive crew members, and (3) working out criteria for the feasibility of the driver's activities. The study findings are particularly important in the context of an increasing moral and psychological load on the human operator in the system.

**Keywords**: train driver, professional activity, human factor, safety of railway traffic.

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## DYNAMIC MODELS IN THE METHOD OF PROJECT MANAGEMENT (p. 46-52)

**Alexandr Stanovsky, Kateryna Kolesnikova, Elena Lebedeva, Ismail Kheblov**

The study focuses on the issues connected with the models and methods of managing the projects, programs and other activities within the project portfolio, which allow the support of management decisions when it is necessary to align the resource requests. We consider the possibilities for improving the efficiency of management due to the artificial planned synchronization, desynchronization or self-synchronization of events in the project subsystems.

This can be achieved due to the devised theoretical basis and practical recommendations on constructing the phase dynamic models of the dynamic systems of design activities, which is illustrated by the system of "financial and material supply – current demand of materials". The self-tuning dynamic system of "project management in the foundry construction" proved to be efficient and gave positive technical results in the implementation of the real project.

It is proven that synchronization and desynchronization are essential parts of those project activities, the exact time of which is impossible to predict and, hence, to plan in advance. The project should provide for the possibility of self-synchronization of the events. The devised method for self-synchronization is based on the concept of the project as a dynamic system, whose attractor is the point of synchronization in the phase portrait. Recommendations on constructing the dynamic models are based on the theoretical foundations of the study of complex systems and the practical experience of planning and implementing the project activities in the construction of industrial facilities.

**Keywords**: project management, synchronization and desynchronization of events, the dynamic model of the project activity, phase portrait.

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## THERMODYNAMIC CRITERIAL SUPPORT FOR THE COGNITIVE TRANSFER MODELS IN THE PROJECT AND PROGRAM MANAGEMENT (p. 53-59)

**Oksana Savel'eva, Iraida Stanovska, Alla Toropenko, Igor Shchedrov, Ekaterina Berezovska**

The study considers the problems of devising and constructing the cognitive models of the material and financial support transfer between the project elements. An effective project management is ensured by the management models proposed for projects and programs that are based on the thermodynamic laws. We suggest that the cognitive models should begin with identifying the elements of the control system that are capable to describe it quantitatively and qualitatively, as well as determining the linkages between these elements. At the level of the cognitive model, each connection between the elements is disclosed to the appropriate equation, which can contain both quantitative (measurable) variables and qualitative (unmeasured) variables. Quantitative variables are included in the model in the form of numerical values.

It is proven that the project management is most effective if there is maximum approximation of the cognitive models for the project support transfer to the analytical models of heat and mass transfer in the classic thermodynamics. The supplied examples of the use of this approach in the actual project activities illustrate its positive technical and economic effect.

**Keywords**: project management, project activity, cognitive transfer models, analytical models of heat and mass transfer.

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