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A MODEL OF STRATEGIC SAFETY MANAGEMENT IN RAILWAY TRANSPORT BASED ON JASTRZEBSKA RAILWAY COMPANY LTD.

Summary. The article deals with the issue of railway transport safety from a strategic aspect. In turn, the concept of developing railway transport safety and the possibility of transferring model solutions to the economic field are presented. The article also focuses on highlighting the most significant criteria in terms of the development of railway safety. All stages in the realization of a relevant strategy are characterized, with a particular emphasis on the conditions for their efficient implementation.

Keywords: strategy, railway transport safety

1. INTRODUCTION

Railway transport plays an important role in the national economy. The basic scope of activity in this sector, involving the carriage of goods and passengers, at the macroeconomic level, enhances the development of other areas of the economy, while, on a microeconomic level, it meets the transport needs of clients. In order to effectively implement its functions

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regarding other sectors, railway transport has to meet a number of requirements. One of them is to guarantee a good level of quality across the provided services. The quality of transportation services belongs to a group of phenomena with an interdisciplinary character; thus, there are many terms used to describe quality. For the purpose of this article, a definition has been adopted, according to which quality refers to a set of characteristics determining the ability of the given service to meet the needs of customers [1, 7].

These features are concretized as quality demands, which in railway transport are related to time (frequency, regularity, rhythmicity and punctuality), spatial availability, safety, cargo, providing comfortable travel, reliability and price [2]. It should be emphasized that the relevant parameters evolve and change over time. Furthermore, a specific character of transport services concerns the importance of individual attributes, whose assessment differs according to whether quality is considered in the context of passenger transport or freight.

An important quality feature of transport services, regardless of the transport type, is railway safety. The definition most fully reflecting the nature of this issue involves safety as a condition in which the risk of damage to people or property is minimized and maintained at an acceptable level or below this level, thanks to the continuous process of risk identification and safety management [3].

The significance of railway safety is proven by the fact that, as one of the few quality parameters, it is subject to legal regulations. The legislative bodies of the EU and Poland have successively implemented EU and national law rules concerning safety management in railway transport. The existing mechanisms mean that the implemented solutions are concretized and obligatory.

The regulations apply to the subjects of both real and regulatory spheres. One of the most significant parts of the safe functioning of railways at the level of companies is the obligatory implementation of safety management systems (SMSs) by transport companies and infrastructure managers, as well as the implementation of maintenance management systems by the subjects responsible for maintenance. At the country level, however, a number of tasks for controlling railway safety and market monitoring in this area has been defined.

All of the actions mentioned above relate to basic requirements concerning the shaping of railway safety. The list is much longer and more specific. It is important to mention that, in railway transport, most of the projects aimed at improving safety are short-term initiatives. However, the railway sector is a specific branch of transport, in which safety depends on many variables that demand long-term outlay. Among the basic elements are the technical conditions of the infrastructure and rolling stock, the extent of implementing new technological solutions, traffic and railway transport organization, and staff competences. These constituents form an integral part of the railway system, which requires infrastructure expenditure, as well as implementing appropriate legal and organizational solutions in order to safely serve a purpose. The context implies the need to design and implement coherent concepts by taking into account issues connected with railway safety in the long term. The tool for the implementation of this approach concerns the strategic management of the company.

Taking the above into consideration, the purpose of the article has been set, which is to provide a strategic approach to the issue of railway safety using the example of the Jastrzebska Railway Company Ltd. (JSK Ltd).

2. BASIC ELEMENTS OF STRATEGIC MANAGEMENT IN JASTRZEBSKA RAILWAY COMPANY LTD.

Strategic management is understood as a continued and dynamic process within a company, which involves resources monitoring as well as forming and implementing effective strategy aimed at developing and increasing the competitiveness of the company in the long term [4, 8]. In short, it is an effective tool, which supports the running of every business and company. Adopting a strategic management model is particularly important in the case of sectors such as railway transport.

Railway transport, similar to other branches of transport, is characterized by particular features and functions. The basic function carried out by railway transport is enabling passengers and freight to travel long distances. In turn, the smooth and safe performance of the transport process depends on the railway infrastructure, which must comply with specific technical parameters

In Poland, railway access services are provided by ‘infrastructure managers’, which are also responsible for ensuring the good condition of the railway infrastructure. One of these infrastructure managers is JSK Ltd., which was established on 1 April 1998 as subsidiary of the Capital Group of JSK Ltd. (JSW S.A.). As an authorized infrastructure manager and, in accordance with statutory requirements, it is engaged in building and maintaining railway infrastructure, providing traffic management to railway lines, keeping the railway infrastructure in a condition fit for safe operation, providing access to railway lines for the passage of trains and associated services, and managing properties that form part of the railway infrastructure.

The tasks carried out on the railway lines, where coal from JSW S.A.’s mines is transported, are very specific. Taking into account the total length of the infrastructure (167 km), the company occupies the fifth place within the structure of the market [5]. Apart from infrastructure management, JSK Ltd. carries out tasks as rail siding user.

As stated above, strategic management is necessary for the systematic development of companies. Such a process is focused on formulating and implementing strategies at various levels. JSK Ltd.’s strategic management is defined in two dimensions, which are informed by the strategic structure of the company (Figure 1). The first dimension refers to the general level and concerns the company’s main strategy, which defines the basic directions of its development. The second level focuses on the formulation and implementation of functional strategies, which specify and expand assumptions indicated in the basic strategy.

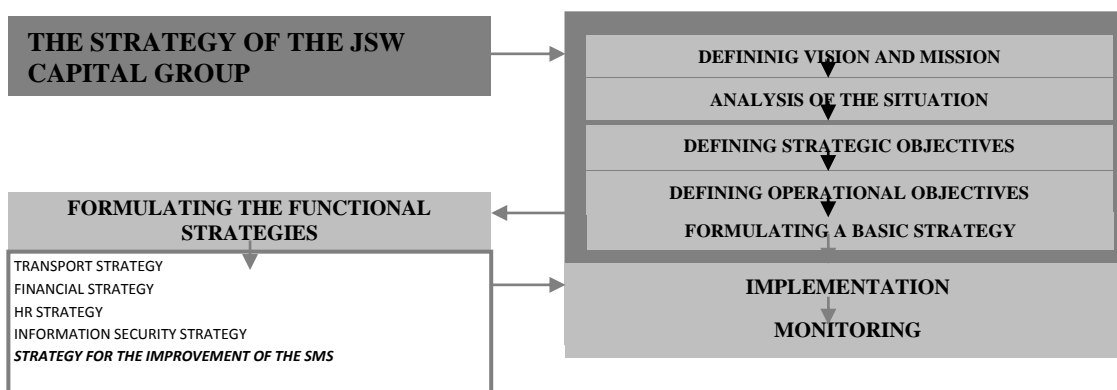


Fig. 1. The general structure of strategic management in JSK Ltd.

The diagram above depicts strategic management within JSK Ltd., which has proceeded according to a certain pattern. The determinant of the development of the company's basic strategy has been the strategy of the JSW S.A. Capital Group. On the basis of directions indicated within this strategy, the vision and mission of the company have been determined. The analysis, including an assessment of the environment and the potential of the company, has been conducted. The next step has been to define strategic and operational objectives and formulate a basic strategy. The functional strategies have been developed, taking into consideration the character of the company and adopted objectives in the main strategy. These include: financial, information security, transport and HR strategy, as well as strategy related to SMS improvements. The latter is the subject of this article. The developed strategies and the operational programmes have been implemented as planned. The permanent feature of the company's strategic management is monitoring the implementation of all strategies.

The strategic management of the company is a very complex undertaking. This is confirmed by research, which shows that only a marginal part of the strategies is successfully implemented⁴. Therefore, when developing and implementing strategic plans, the most common barriers should be taken into consideration.

In the relevant Polish literature, it is difficult to find references to research in the field of practical aspects of strategic management, including its effectiveness. However, interesting observations in this area have been made by the American researchers Michael C. Mankins and Richard Steele, who indicated that, in practice, companies have to deal with a so-called strategy-to-performance gap. According to the above-mentioned authors, the source of failure in strategic implementation can be mostly associated with:

- Inadequate or inaccessible resources
- Wrong formulation of the strategic objectives
- Poor communication of the strategies (encryption)
- Inadequate strategy monitoring
- Inadequate incentive system
- Lack of a correction system within the strategic assumptions
- Weak leadership [6]

This proves that strategic management requires concentration on all stages of the process. Each element, from the moment of strategy development up to its implementation and monitoring, is essential. Particular attention should be paid to aspects that are the causes of strategic project failure. The observations indicate that such barriers are usually internal. This means that the effectiveness of the strategy largely depends on the methods and tools used by the company in the area of strategic management.

The basic strategy of the company is formulated at the high level of generality. In order to meet the objectives, they have to be detailed within the functional strategies or operational programmes. An improvement strategy for a railway SMS is an example of a strategic approach to railway safety development by JSK Ltd.

⁴ The research conducted by Kaplan and Norton indicate that only 10-30% of strategies are effectively implemented.

3. IMPROVEMENT STRATEGY FOR A RAILWAY SAFETY MANAGEMENT SYSTEM

In accordance with the applicable law and regulations, the company has implemented an SMS, whose aim is to provide an adequate level of security. As already mentioned, creating an optimum level of safety in railway transport requires tools of a strategic nature. Therefore, the company has decided to create and implement a strategy for improving the SMS for railway transport in JSK Ltd., which will be implemented over the period 2016-2025. The strategy is an example of strategic management in the area of a railway safety.

As shown by numerous examples, translating strategic concepts into economic practice can be quite difficult. Taking into consideration barriers that may occur during the implementation of the project, the company has prepared for the whole process. The key element has been to develop a model of strategic safety management in the JSK Ltd., which is a reference point for further work. This approach has allowed for the systematization of activities and procedural preparations at each stage of the functional strategy.

The described model has been created on the basis of theoretical concepts and adapted to the needs of JSK Ltd. Therefore, not every element has been recognized. In order to increase its usability, it has been constructed in a way that enables its extension and adaptation to the needs of other companies.

The model of safety management in rail transport in JSK Ltd. has been divided into four areas. The first area includes the division of the safety management process into three stages. The next identifies basic input variables. The third area defines actions that should be implemented within a given stage. The last area provides example tools for supporting strategic safety management in railway transport.

The model distinguishes three stages: I) preparation, II) strategic safety management in the railway area, III) summary (Figure 2).

Stage I (preparation) was scheduled for 2015. This stage focused mostly on activities connected with the selection of project members for the safety strategy team. This was very important, as the team members had to possess the necessary competences and experience in the field of strategic management. The input variable at this stage concerned the analysis and assessment of professional competence. Particular attention was paid to the experience, knowledge and skills of employees in the area connected with formulating and implementing strategies. The next step was to identify competence gaps, on the basis of which training needs were defined. In the case of JSK Ltd., the outcome of the analysis was organizing workshops on the methods of strategic management. The last step in this stage was to formally establish a safety management team.

The preparatory stage, while not usually included in theoretical models and not directly related to the process of strategic management, forms an important part in the process, as it brings together the personnel needed for the entire project. As a result, the risk of incorrectly implementing the strategy is minimized.

Stage II refers to the main part of the process, that is, strategic safety management in the railway area. Its implementation period is 2016-2025. This stage has been divided into two phases: the first is connected with strategy formulation and the second is the so-called implementation phase.

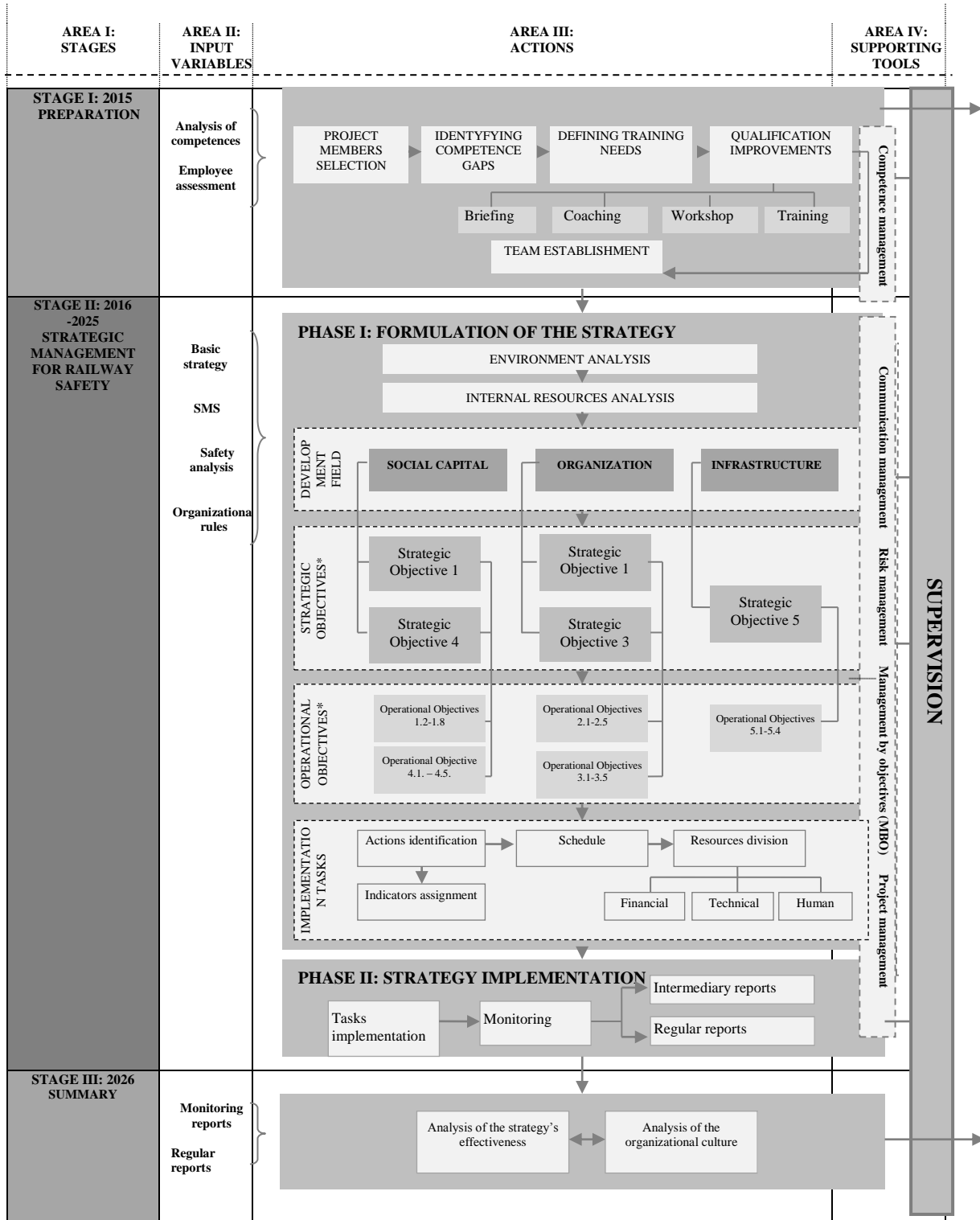


Fig. 2. Model of the strategic railway safety management in JSK Ltd.

* The structure of the strategic objectives is presented in Table 1.

As shown in Figure 2, the starting point of the first phase of the second stage concerned assumptions included in the basic strategy of the company. The inclusion of the programmes and projects, which were already implemented in the area of safety, has been equally important. Therefore, the solutions applied to the SMS have been followed. The organizational structure of JSK Ltd. has also verified the company's ability to implement the strategy. The aforementioned variables have formed the basis for defining the activities listed in the second stage. As a result, it should be possible to maintain the consistency of the designed and implemented projects. According to the adopted model, the next step is to examine the internal resources and deficiencies of the company, as well as the external environment in the context of railway safety. In the case of JSK Ltd., a SWOT analysis was conducted, which helped to systematize data and identify the company's strengths and weaknesses in the area of railway safety. The analysis highlighted three areas that needed improvement: social capital, organization and infrastructure. Strategic goals have in turn been assigned to each area.

The work involved defining five strategic objectives aimed at improving rail safety in JSK Ltd. The goals have specified and translated into operational objectives (Table 1).

Tab. 1

The structure of the strategic objectives in JSK Ltd.

Field	Strategic objectives	Operational objectives
Social capital	OBJECTIVE 1 Building awareness of safety in railway transport	1.1. Inclusion of employee competence in the annual assessment: "knowledge and compliance with the SMS" 1.2. Organization of a "safe railway" competition 1.3. Increased amount and effectiveness of training on the SMS 1.4. Development of an SMS guide for technical services 1.5. Joining the "Safe Passage" project 1.6. Development of the internal and external communication system in the area of safety 1.7. Organization of competitions connected with railway safety for schools and kindergartens 1.8. Cooperation with public institutions, police and fire brigades in the field of railway safety
Organization	OBJECTIVE 2 Control over railway transport safety	2.2. Additional audits (process of traffic management, infrastructure management audits) conducted by an external and independent body 2.3. Mapping the monitoring indicators 2.4. Expansion of the monitoring system 2.5. The use of drones for monitoring rail infrastructure in areas prone to theft

Organization	OBJECTIVE 3 Improvement in the safety and efficiency of the implemented processes	3.1. Optimizing the processes of operational standardization 3.2. Establishment of a research and development unit 3.3. Including sidings into SMS 3.4. Publishing accident bulletins 3.5. Cooperation with scientific research and/or consulting units in the area of safety improvement
Social capital	OBJECTIVE 4 Recruiting, maintaining and developing qualified staff	4.1. Cooperation with universities in the field of apprenticeships and traineeships 4.2. Organization of practical activities for secondary school students 4.3. Developing a model of competences and programmes to support professional development 4.4. Cooperation with universities in the delivery of lectures by the company's employees 4.5. Participation in conferences and trade fairs dedicated to the rail transport
Infrastructure	OBJECTIVE 5 Improvement in the quality of railway infrastructure	5.1. Implementation of the project for CCS system computer equipment 5.2. Automation of railway crossings 5.3. Organization of research sites 5.4. Modernization of the railway infrastructure

In order to realize goals and assumptions, it is necessary to develop comprehensive plans, which should define the way of implementing a functional strategy. In light of the above, the next step was to operationalize objectives for specific tasks. The schedule was set by specifying the execution time and the sequence of each operation. A very important aspect, which in practice is very often underestimated, was to provide resources for the implementation of initiatives. Therefore, technical, financial and human resources were assigned to each task. It should be emphasized that the resources had to adequately meet the needs, while those personnel responsible for achieving the goals had to be competent. The monitoring of the level of strategic implementation was equally important. In relation to this, the monitoring indicators were developed for each task along with the clarification of their initial and target values.

The closure of the strategy formulation phase allowed for the transition to Phase II, i.e., implementation. This has involved the implementation of previously defined tasks and regular assessments of the level of strategic implementation. Such assessments are carried out as part of the monitoring process, which enables an analysis of the possible causes behind the failure of scheduled tasks. In JSK Ltd., the monitoring process is based on systematic information and data gathering (both quantitative and qualitative), data verification, indicator calculations, and data analysis, as well as an assessment of the implemented actions and objectives. On the basis of the analysis and assessments, appropriate recommendations will be formulated, which may result in updates to the strategy. The managers of the organizational units responsible for monitoring the effectiveness and efficiency of the strategy are required to submit quarterly reports. The unit responsible for the organization and supervision of

the entire monitoring process, including the submission of regular reports, is the section that deals with safety.

Stage III (summary) is scheduled for 2026. At this stage, an assessment of the actual effects of the strategy will be carried out. The effectiveness of the JSK Ltd. strategy will be verified by checking the extent to which the strategic goals will be implemented. For this purpose, the monitoring reports and the results of the organizational culture analysis, which will be conducted before and after the strategy's implementation, will be used.

What is very often decisive in terms of the effectiveness of a strategy is a company's ability to use appropriate tools to support strategic management (Area IV). The range of solutions can be broad and varied. In the case of JSK Ltd., the basic methods assigned to the area related to supporting tools for the development and implementation of the strategy, in order to improve the railway SMS, are: competence management, communication management, management by objectives, project management, risk management and supervision at every stage of the process. The range of used management instruments will be adapted to the implementation needs of the strategy.

The presented model is an example of the use of the strategic management concept in the field of railway safety. As already mentioned, this model is an attempt to explain the complex process of strategic management. A characteristic feature of this idea is the inclusion of two additional steps: preparation and summary.

3. SUMMARY

From the perspective of rail market needs, a crucial part of the development of this branch of transport is to ensure a safe transport process.

An SMS, which is an obligatory form of management instrumentation, is an important tool for facilitating security in the rail sector. It allows for improved processes and quick responses to emerging threats. However, most of the actions undertaken within the adopted systems by the railway companies in Poland are planned and implemented in the short term. Given current conditions, purely operational programmes are insufficient. In order to reinforce rail safety, it is crucial to carry out coherent actions on a systematic basis within strategy projects. The strategy should include issues connected with rail safety and dovetail with the main strategy, as well as complement previously implemented ideas in this area.

The literature more often states that the implementation stage determines, to the greatest extent, the effectiveness of a strategy. In the opinion of the authors of this article, every stage of strategic management has a significant impact on strategic effectiveness. The preparation and summary stages, as presented in the constructed model of strategic railway safety management, are of equal importance.

The assumption of this article was to identify the most important strategic contexts, which should be taken into consideration in the development of conditions for improved rail safety. That said, this article has only considered an outline of this complex issue. At this stage, it seems necessary to initiate research in order to verify the presented scheme of strategic management in the area of railway safety. In particular, checking the efficiency of the implemented solutions is paramount.

References

1. Kotler P. 1994. *Marketing*. Warsaw: Gebethner & Ska.
2. Tomanek R. 2004. *Operation of Transport*. Katowice: UE Press.
3. Slideplayer. "SMS jako element systemu zarządzania w ATO". [In Polish: "SMS as part of the ATO management system".] Available at: <http://slideplayer.pl/slide/2270776/>.
4. Zakrzewska-Bielawska A. 2012. "Strategic management in high technology enterprises". In J. Werewka, ed., *Project Management in an IT Company. Methodology and Management Strategy*. Cracow: AGH Press.
5. UTK. 2015. *Ocena funkcjonowania rynku transportu kolejowego i stanu bezpieczeństwa ruchu kolejowego w 2014*. [In Polish: *Assessment of the Functioning of the Rail Transport Market and the State of Railway Traffic Safety in 2014*.] Warsaw: UTK.
6. Kaplan R.S., D.P. Norton. 1996. "Using the balanced scorecard as a strategic management system". *Harvard Business Review* 74(1): 75-85.
7. Saruchera F. 2017. „Rail freight transportation concerns of developing economies: A Namibian perspective”. *Journal of Transport and Supply Chain Management* 11(a288): 1-9. DOI: <https://doi.org/10.4102/jtscm.v11i0.288>. ISSN: 2310-8789.
8. Bartuška L., L. Černá, J. Daniš. 2017, "Costs Comparison and the Possibilities of Increasing the Transport Capacity with a Selection of the Appropriate Railway Wagons". *Nase More* 63(3): 93-97. ISSN: 0469-6255.

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