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THE ROLE OF A RAILWAY INFRASTRUCTURE MANAGER

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Introduction

The purpose of this article is to specify the role of a manager in contemporary railway infrastructure (RI) within the territory of the Czech Republic. The authors further intend to determine certain problems and shortcomings relating to the Czech infrastructure and to outline possible solutions.

1. Resources

The role of a manager in European railway infrastructure is indicated in the EU Directive 1991/440 and in relating documents, such as e.g. Railway packets, and roughly concerns the following fields of activities:

- Operating railway infrastructure (ORI)
- Providing for RI operability
- RI modernization and development
- RI capacity allocation.

Act on Transformation N. 77/2002 Sb. of 1 January 2003 defines the role of a railway infrastructure manager (IM) in the Czech Republic. The Railway Infrastructure Administration (RIA) was appointed to perform this role.

It was almost 9,500 km of rail routes the RIA became responsible for. The structure and categorization of the routes (i.e. the nationwide routes included into the European cargo railway system /TEFRN/, national and regional lines) is shown in Fig.1, where the proportion of so called transit corridors in the TEN network presents approximately 50% (this makes about 13% on the Czech lines, i.e. 1,442 km) [2].

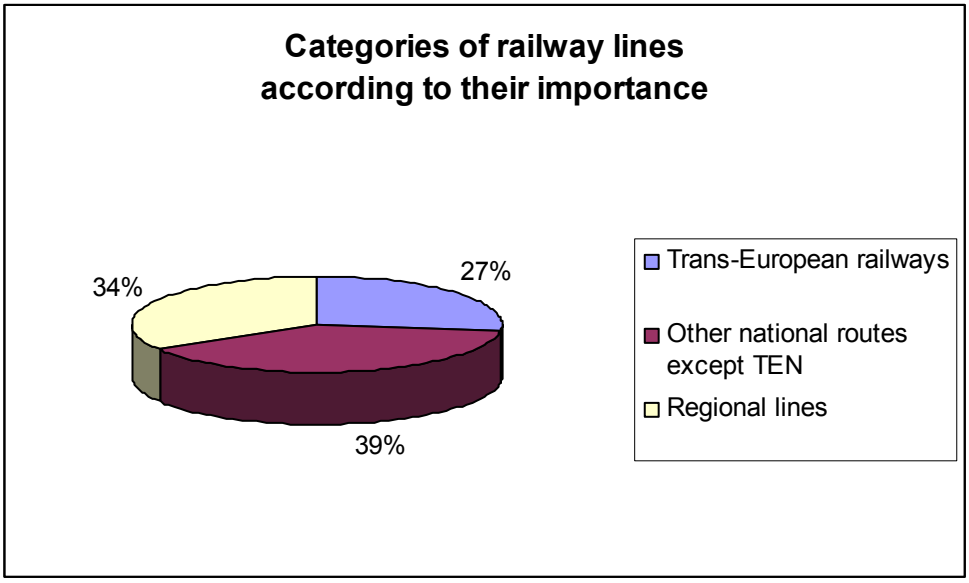

***Fig. 1** Czech Rail categories according to their importance [1]*

The quality of infrastructure the RIA is responsible for is different; it varies largely, and in many cases does not correspond to the current needs and requirements. Since 1993, extensive modernization and optimization has been carried out in so called transit corridors. Its objectives were based on the following international agreements the Czech Republic has recently acceded [3]:

- Connecting of selected networks to the European railway network,
- Completion of the conditions for Czech integration into European structures (the EU, NATO),
- Reduction of environment pollution,
- Operational safety increase by means of new technology,
- Passenger transport speed increase,
- Increase of reliability and regularity in freight transport,
- Extension of forwarding services by means of international intermodal transport [MDČR].

Despite the evident improvement of modernized corridor lines parameters, the construction works keep revealing that the above mentioned objectives have often not

been feasible in view of the recent trends and requirements for organization, coexistence of long-distance, regional and suburban passenger transport and freight transport.

Moreover, the main flow of financial support has been directed to the above mentioned lines, which resulted in certain stagnation of other Czech lines that have only undergone the most essential maintenance.

The problem links to another phenomenon occurring in the 1990s: the decline and change in the railway transport structure. At the extreme, the RIA administered infrastructure seems to be insufficient in some areas (line speeds, approach lines capacity in large agglomerations, technical state in general); or, contrarily, it is excessive in terms of e.g. number of rails in some stations, marshalling yards, etc. The RIA therefore faces a difficult task of essential investments on one hand and looking for savings in places where the infrastructure maintenance costs cannot be justified by the traffic density. Non-systemic and badly coordinated approach to the problems may result in negative rather then positive changes.

2. The present state

Let's take a short look at the role of RIA as an infrastructure manager. The reality is not always positive when talking about the practical completion of the above listed tasks.

However, we cannot only blame the IM. Nevertheless, at certain areas their responsibility is worth discussion.

The transformation has not been carried out in an ideal way, as well as the RIA requirement to outsource the operational activities from the Czech Rail, a.s. Another pitfall seems to be a smaller volume of finance invested in railway compared to road infrastructure.

Another fact to think about is the way of development and modernization of the administered infrastructure when taking in consideration the requirements of the present or future railway operation and relevant technology. We have to admit that many projects of a high quality construction engineering lack the technology and operational control quality and the complexity of the solution is often inadequate, if not completely missing.

Following are several examples: The operational control optimization project [4] has a highly positive impact on the appropriate costs reduction, especially on wage costs. Nevertheless, there is no intention to solve the adaptation of the appropriate lines where the remote signaling had been introduced (nor is it among the project objectives). The solution does not count on the requirements for operational needs, such as line speed increase, system travel times, double track, railway platform building, etc. Similarly, the electrification of certain lines (e.g. Karlovy Vary – Kadaň) is carried out inappropriately. The above mentioned events are stressed by the fact that except

of operations, the optimization process is accompanied by the reduction of sidings at the expense of the traffic quality and fluency.

The train stations at Žihle and Mladotice on the line Pilsen – Žatec are among those that have undergone modernization within the remote signaling introduction. The reduction of rails to 2 resulted in a limited traffic-carrying capacity in normal operation, not mentioning the diverted trains introduction from the modernized line Pilsen - Cheb (as far as Mladotice line is concerned, there are 3 rails, however, one of them can only be used in one direction due to a long-time closure whereas the re-introduction of the idle section seems to be almost impossible). Although certain cost savings have been achieved in a short-term perspective, the future prospect is not dealt with very well.

Another problem to be solved is the modernization of large rail junctions and approaching lines. In particular, it is the junction Brno and the “New Line” in Prague.

In the Brno project, the IM supports the option with no firm backup in the scope of operations while its development, especially in terms of new technology, is left aside. Political aspects have been of certain importance in the project, which significantly limits the expert point of view.

The media-supported “New Line” will certainly improve the parameters of the lines leading to Brno main station; nevertheless the capacity will obviously not be sufficient in regard to the scope and structure of the required long-distance and sub-urban railway traffic.

Doubling the rails in section Praha Běchovice – Praha Libeň can be assessed the same way. The accordingly loaded lines abroad usually have separate infrastructure for long-distance and sub-urban traffic; having almost always two parallel double-tracked lines in sub-urban sections (Dresden, Zürich, Wien, Köln...). As far as Praha is concerned, it was already in 1995 when feasibility studies existed focusing on the increase in the number of rails to four in the above indicated section [5]. However, the current project is carried out with only 3 rails.

The above examples demonstrate a significant fact: the IM should act as a subject cooperating with partners who are accountable and highly involved in the infrastructure administered by them. That is, to be engaged in a much more precise problem solving with the passenger transport clients (the Ministry of Transport and Czech regional authorities) and with transport operators. All the stakeholders in the process should discuss both their short- and long-term needs.

Unfortunately, mid- to long-term development of railway transport has not been sufficiently reflected by the IM in general. In support of the RIA we have to note that neither the clients nor the freight forwarders are in a rather uncertain situation. All the above indicated problems are consequently reflected in the infrastructure – in its more or less non-conceptual reconstruction and modernization lacking a firm plan for future operations. Certain role is performed by a strong lobby from the side of civil engineering

companies whose priority is to built new objects, not to operate rail transport. Due to such a misconcept in reconstruction and modernization, the value of final constructions is highly limited, which reduces their social importance especially in terms of the invested finance.

3. Feasible solutions

Processing different development scenarios in combination with mid- to long-term IM plans is a significant task. However complicated, it is an inevitable task. The financially demanding investments in infrastructure cannot be solved by a trial and error method.

The background has to be an unambiguous transport planning. The authors suggest the following order of individual steps:

1. Transport relations and their expected development

a. flows in passenger transport, plan of objects construction

b. transport flows and relations in freight transport

c. state transport policy

2. Trends and prospects (short-, mid- and long-term)

a. organization and scope of passenger transport

i. frequency, connections, minimum traffic scope

ii. changing points

iii. service methods

b. organization and scope of freight transport

i. number of trains

ii. transport quality (e.g. Just-in-time)

iii. transport quality in regard to the capacity

c. Scenarios for realization

Different options at consideration of the requirements and needs listed in 1 and 2

3. Simulations

a. evidence of individual scenarios feasibility

b. answering the questions following from the scenarios

c. notification of weak and problematic points of the scenarios

4. Adjusting the scenarios according to the simulations outcomes

Optional further testing

5. Scenarios processing

a. specification of the required interventions in the infrastructure

b. specification of the required rolling stock

c. assessment of financial demands and feasibility

6. Selection in regard to different aspects

a. economic aspect

b. political aspect

c. expert aspect

d. other

Use of simulations is listed among the aspects of transport planning as an option to get a relevant background for the decision making procedures.

4. Simulation and its practical use

A good simulation model is a suitable tool for the infrastructure assessment, serving also for testing of the new concept feasibility in passenger and freight transport. It is used for the assessment of timetables, infrastructure utilization, etc. Numerous simulation programmes are at our disposal with macroscopic or microscopic evaluation of the given infrastructure.

The use of simulation in rail transport planning has widely spread in Europe. Good simulation practices in Switzerland, Netherlands and partly in Germany underline the fact that in railway planning it is appropriate to base the processes on the triangle operation (suggested timetable) – infrastructure – rolling stock. This attitude enables its users to bring a more systemic and effective solution; and its use is justified especially in tact transport.

Different solutions of timetables that involve and combine the requirements for the rolling stock (such as tilting units, required acceleration, minimum speed of the set) and for the required infrastructure (tract speed, slope, train resistance, etc.) allow for answering important questions already during the preparation of the required documentation. The preparation should reflect the network/line aspect as well as detailed order of individual station units and tracks (gridirons, number of running tracks, etc.). In traditional approach to the planning procedures, the problems of future timetables and relating operational problems are usually moved to the very end of the preparatory works. The consequences of such attitude can cause difficulties in realization of the consequent operational concepts. At the extreme, the only feasible solution can be additional investment at high acquisition costs.

Financial aspect in the use of simulation should not be neglected. Knowing roughly the prices of individual infrastructure parts, construction interventions and the ability to determine the expected operational costs for different scenarios, such scenarios can be assessed continuously during the analysis of the ratio between the invested costs (building or operational costs) and the profit from such investment.

The use of simulation programmes has been limited in our country so far, which is rather detrimental to the current projects and their future outcomes.

The project “Optimization of Transport Operations and Scope of Infrastructure at the Lines Outside the Corridors” solved at the Jan Perner Institute, o.p.s., the Department of Transport Technology and Management has the change in the recent non-systemic and non-methodological approach among its priorities. One of the important project outcomes should be the methodology capable of the determination of the appropriate scope of infrastructure in regard to the assumed scope of railway operations. Simulation software will certainly be among the natural tools, especially the assessment of different operational and technology scenarios.

Conclusion

Advanced and accelerated approach of IM to the administered railway network expects an active participation in the decision making processes about the future in cooperation with the passenger railway transport clients as well as with those in freight and passenger transport. Such an active attitude also requires different scenarios for the development up to the level of rail schedules. An important tool is a complex transport planning. In view of individual operational and technological options assessment, an essential tool to use is computer simulation. All of the above mentioned prerequisites calculate with a change in contemporary understanding of the problems discussed in this article.

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References

1. MELDUŠKA, B. *Dálkové řízení železniční sítě České republiky*, Univerzita Pardubice, 2007.
2. K-REPORT, Český dopravní server, [online]. [2008] [cit. 2008-1-29]. Dostupný z WWW: <http://www.k-report.net/koridory/histori3.htm>.
3. Ministerstvo dopravy [online]. [2008] [cit. 2008-1-29]. Dostupný z WWW: <http://www.mdcr.cz/cs/Drazni_doprava/Rozvoj_zeleznicni_infrastruktury/>.

4. KOMÁREK, J. *Racionalizace řízení provozu na železniční dopravní cestě a dopravní infrastruktury*, Železktuel 2007, Pardubice.
5. ÚTS, ČD-DDC, Praha - průjezd železničním uzlem, Praha-Bubeneč - Praha- Libeň - Úvaly, ILF CE, 12/1995.
6. ORTÚZAR, J., WILLUMSEN, L. *Modelling Transport*. John Wiley and Sons, Chichester, 2001, 499 s. ISBN: 0-471-86110-3.

Resumé

ÚLOHA MANAŽERA ŽELEZNIČNÍ INFRASTRUKTURY

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Článek se zabývá úlohou manažera železniční infrastrutkury. V úvodu je specifikováno postavení tohoto subjektu v ČR a provedena kritická analýza současného stavu doplněná o několik příkladů. Následuje zamyšlení o hlavních úkolech manažera infrastruktury s důrazem na dopravní plánování a tvorbu výhledových provozních scénářů. V závěru jsou uvedeny možnosti simulace dopravního provozu jako výzkumné metody pro dopravní modelování v kontextu úlohy manažera železniční infrastruktury.

Summary

THE ROLE OF A RAILWAY INFRASTRUCTURE MANAGER

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The role of a railway infrastrucuture manager is considered in the paper. The position of this subject in the Czech Republic is specified at the beginnig. The critical analysis of contemporary state supplemented of several examples is done in the following part. There is a reflection above main tasks of a railway infrastructure manager with emphasis on transport planning and making of prospective operational scenarios. The possibilities of simulation as a research method in context of task of railway infrastructure manager are mentioned at the end of the paper.

Zusammenfassung

DIE AUFGABE DES EISENBAHNINFRASTRUKTURMANAGERS

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Der Artikel beschäftigt sich mit der Aufgabe des Eisenbahninfrastrukturunternehmens (EIU). In der Einleitung wird die Position von diesem Subjekt in der Tschechischen Republik spezifiziert und im nächsten Teil wird die kritische Analyse vom gegenwärtigen Stand durchgeführt. Die Analyse wird um einige kritische Beispiele aus der Praxis ergänzt. Es folgt eine Überlegung über den Hauptaufgaben des Eisenbahninfrastrukturunternehmens mit dem Akzent auf die Verkehrsplanung und Gestaltung der perspektiven zukünftigen Betriebskonzepte. Im Textabschluss werden die Möglichkeiten der Eisenbahnbetriebssimulation als Forschungsmethode fürs Verkehrsmodellieren im Kontext der Eisenbahninfrastrukturunternehmensaufgaben angeführt.