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Praćenje i evaluacija kvaliteta u uslugama železničkog saobraćaja kao element menadžmenta kvaliteta

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Apstrakt: Članak ima za cilj da objasni proces realizacije usluga u makedonskom železničkom poslovanju kroz preko potrebno uspostavljanje kriterijuma za praćenje i vrednovanje kvaliteta usluga kao efikasne zaštite javnog interesa. Članak dalje ukazuje na viši kvalitet u uslugama prevoza, bolje uslove za sve zainteresovane strane učestvuju u životnom ciklusu usluga prevoza. Osim toga, studija tvrdi da sa primenom posebnih kriterijuma za kvalitet, možemo stvoriti preduslove za uspostavljanje mehanizama za razvoj i optimizaciju rezultata kao sistem za kazne zbog neispunjavanja uslova ugovora. To proizilazi iz činjenice da prikupljeni podaci treba da budu zasnovani na adekvatnom sistemu prikupljanja, analizi podataka i rad predlaže određeni pojednostavljeni model za analizu i procenu kvaliteta saobraćajnih usluga. Ovaj drugi model se sastoji od kvalitativnih i kvantitativnih varijabli sa tehničke tačke gledišta i sa stanovišta nivoa kvaliteta transportnih usluga do krajnjeg kupca.

Ključne reči: Kvalitet, menadžment kvalitetom, železnički transport

Monitoring and Evaluation of Quality in Rail Transport Services – An element of Quality Management

Abstract in English: The paper aims to explain the process of realization of the services in the Macedonian railway business through necessary set up of criteria for monitoring and evaluation for the services quality as an effective protection of the public interest. The paper further suggests that higher quality in the transport services leads to better conditions for all stakeholders who take part in the lifecycle of the transport services. Moreover, the study argues that with applying particular criteria for quality, we create pre-conditions for setting up a mechanism for developing and optimizing the results as the system for penalties for not meeting the contract conditions, as well. It stems from the fact that the collected data should be based on adequate collecting system, whereas data analysis and the paper propose certain simplified model for analysis and assessing of the transport services quality. The latter model consists of qualitative and quantitative variables from technical point of view and from the perspective of quality level of the transport services that are provided to the end customer.

Keywords: quality, public interest, qualitative parameters, quantitative parameters, transport services

1. Introduction

The quality of railway transport services is effected primarily from the decisions taken by the competent authorities in the name of responsible for rail transport person/entity. The regulatory function is implemented through a specially created system of quality control (Evans & Lindsey, 2002). This control is achieved through the following measures:

- Control of the quality process which is formed as a control variable in the set of quantitative and qualitative indicators;
- Control of carried out service is provided by identifying and analyzing deviations and violations of quality of service;
- Control system for quality management;
- Policy and quality objectives are introduced in order to provide direction in the management of the organization.

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It is an imperative to determine the desired results and assist the organization to use its resources to achieve better results (Flyvbjerg, 2013). Quality objectives must be consistent with the policy and the desire for continuous improvement, while using measurable indicators for reporting. The achievement of quality objectives can have a positive impact on product quality, the efficiency of operations and financial performance and thus - rely on the satisfaction and confidence of consumers of rail transport.

On the basis of what the paper formulates, there are following objectives for the process of strengthening the system of quality management:

- Formulating and maintaining the policy and quality objectives in the field of railway transport;
- Introduction of policy and quality objectives throughout the organization to increase awareness, motivation and involvement;
- Definition and presentation of stipulated requirements;
- Ensuring that appropriate processes enable people to meet the requirements of customers and other stakeholders and to achieve quality objectives;
- Ensuring the construction, implementation and maintenance of the effective and efficient system of quality management.

2. Methodology

In order to form a better functioning system in the railway business, it should be developed based on the following principles (Flynn, et.al., 1994):

- Customer orientation – Railway companies depend on their customers and therefore we should understand their present and future business needs. This leads to understanding their requirements and striving statistics of their expectations.
- Effective management - The main objective of the operation of the railway is improving quality. State authority plans and takes all possible measures to ensure the necessary conditions to achieve specific objectives, i.e. for tasks, and hence the overall objectives. The working methods are aimed at clearly defining responsibilities, clarifying the issues and seeking options for their solution.
- Involvement of all stakeholders - state body as a way of placing tasks and building information arrays, including discussions on all important issues, allowing significant possibilities for improvements.

Measurement of the status quo

The model deals with the measurement of the activity as a separate procedure from the control process in rail transport. It focuses on the key role as an element of feedback in the management process. The assessment is expressed in a set of activities related to the studies of the tasks of the centers of responsibility (described in the reports) resulting from the annual objectives of rail transport undertakings. In the procedure the deviations are defined so that it makes sense to take corrective action (significant deviations).

The assessment procedure is the penultimate operation procedure of the control process (Montgomery, 2007). It has a direct connection with the two procedures of the process - pre- and post-January. The assessment procedure is preceded by a procedure of analysis of variance for the period. The analysis of deviations ends with a detailed classification of variations in species and in relation to their causes. The procedure for analyzing information comes in total with (cumulative) unacceptable deviations of the evaluation procedure. Based on these deviations the estimates of activity are generated for the reporting period in the eponymous procedure. They are the product of the evaluation procedure. The information from the assessment procedure and the procedure for the analysis of variance was used in the final process procedure (procedure "reaction"). The reaction in the management of railway consists of:

- Reporting of various entities in the organization of the results of the analysis of deviations and evaluation
- Taking corrective action with respect to operations.

In creating the rating two types of data are applied. The unobjective data is applied in order to understand the data that do not depend on anyone's judgment. Such data typically are applied periodically by authorized persons in the administrative registers, forms or official databases. Then all these pieces of information are aggregated and processed at different levels and are then available to certain users in the form of reports, statistical publications, databases and more. The rating system of quality indicators is used from several sources - data from administrative databases of the Ministry of Transport and Communications, data from railway companies,

international statistical database rail. If the data is subjective, it depends on one's judgment. Such data is typically collected through sociological methods of collecting information, then summarized and analyzed. Purely subjective information concerns itself with respondent's personal experiences, feelings, judgments about how somebody likes it, is useful or valuable to him. With regard to this information respondent authority of last resort in the sense that there can be more authoritative judgment. For example, managers of railway companies and external assessors can agree that rail transport services were of sufficient quality.

If customers are convinced that this mode of transport has been insufficiently accessible to people with special needs and they have experienced difficulties in using it, we have to evaluate the transport service as insufficiently accessible. When it comes to facts, the survey is normally alternatively used when data cannot be collected otherwise. For example, if there is no record that describes cases of impossibility of transporting persons with special needs, one way to get objective information that otherwise is to ask customers to tell us whether they are witnesses of such cases. There is probability of a hard measurable error associated with recall of facts willingness to share it and more. But in all cases the inability to use this mode of transport remains a fact that is potentially verifiable and otherwise.

Choosing a scale for measuring

At the beginning it is important to clarify what the paper aims to explain by rating and what is in experts and practitioners' opinion the difference between rating and ranking system. The rating is a type rating that ranked arranges objects (quality indicators) for some relatively enduring characteristics. In this type of rating the rating differs from the rankings as a result of specific, individual event. It is necessary to make a difference between the results of a particular event and long-term performance of the business based on predefined indicators. The rating system is a generalized method of producing sustainable charts called rating. Of course, much of the new rating is not arranged indicators in a new way, just because performance must have (and actually has both shows of our rating system) defined sustainability. So if a railway undertaking is good at something, it is very likely to be good at other things.

Measurement of the scale and the rating of individual performance have 5 rates:

- 1-dissatisfied
- 2-happy
- 3-best
- 4-very good
- 5-excellent.

Source: Authors

Defining the object of study in our rating system has all possible rankings within the key areas of activity.

- Movement of trains operating perspective;
- Movement of trains from a commercial perspective;
- Safety;
- Opportunities for realization of transport service;
- Availability of transportation for persons with special needs;
- Status of the rail market;
- Ability to accomplish the capacity of the railway network;
- Transport service for people with special needs;
- Status of the rail market;
- Ability to accomplish the capacity of the railway network.

The idea of the team was to compare only comparable things. In purely computational plan, of course, there is no problem to do some rock which ranks indicators as a whole. The numbers and ranks cannot give a sense of order. Only people can. We never thought how we can interpret an arrangement in which they are mixed in their various meaningful features rail activities. It could be argued that in this case can be compared to the

management of railway undertakings and their activities, their prestige in society, the quality of administrative and other activities.

The paper tries to develop a system that offers leader boards only within business lines. In this case, the interpretation is quite simple, as there are separately identified enterprise infrastructure and railway operators. This provides an opportunity to assess the pros and cons of different services in different activities. For this purpose the following coefficients have been built regarding weight/importance/ performance. The weight refers to the distribution in each group and the sum of the coefficients in the group is equal to 1.

Effective demand in our system requires more effort than "reviewing" an indicator of the quality of rail services, but we are convinced that they are worth. It is at least a basic knowledge of the structure of the railways to allow information seekers to navigate the numbers and the logic of classification of activities and services.

Methodology for assessing the quality of railway transport

For the purposes of assessing a comprehensive method which is based on the use of complex quality indicators. The system works with a total of 36 indicators divided into 10 groups for a total of two players on the rail market. The indicator system was made after a review of international experience and the experience of other countries that have developed a system for evaluating the quality of rail services. Similar groups of indicators can be found in most ratings of varying severity in different combinations.

The assessment is done by the state regulator of rail transport services and for the purpose of self-control from the transport company. In the absence of information about the outcome of the averaging used assessment 1, aligned on a scale of 1 to 5, where 1 means "poor" or lack of assessment 2 - "unsatisfactory" 3 - "average" 4 - "satisfactory" 5 - "very good".

Source of information: Accounting and statistical reports of railway undertakings and national statistics.

The ratings are based on information available and is functionally linked to its security. The choice of weights is the most delicate task in complex assessments (evaluations that include more than one indicator). Most of the possible marks in our rating system, including standardized, are precisely of this type. The choice of appropriate weights is for us one of the most demanding tasks.

The main logic in the choice of weights is that important (relevant indicators) for which there is reliable information must obtain a relatively high burden. By reducing the importance of the indicator and the reliability of data is reduced and gravity. Less important indicators receive less weight even when they vary and are reliably measured simply because their importance for quality assessment as a process and product is great. Even the most important indicators may also receive a lower weight when their measurement is not reliable enough, simply because the information obtained in this way lies within great uncertainty and it is not good to make it crucial.

For all railway companies in this situation there are several options, whereas the bottom direction of activity uses the same system of weights.

Each rating system has its limitations. This is no exception. It provides information for railway companies that have published statistical yearbook. Others, as well as potential participants in this market have not been evaluated. Another circumstance of what we want to pay attention to is that in cases where the information gathered for an indicator of activity is not sufficient to allow us to make reliable conclusions, we are removing them "below the line". This means data on individual indicators for these. For the purposes of assessing the paper a comprehensive method is included which is based on the use of complex quality indicators, obtained by the following algorithm:

1. Definition of the system of quality indicators
2. Determining absolute indicators
3. Choosing a benchmark / base year /
4. Determination of relative changes in performance compared to the base year
5. Decision on acceptance of the results of differentiated evaluation Final
6. Defining parameters of significance indicators
7. Restatement based on the parameters of significance
8. Determination of the integrated quality indicator

Table 1: Weight of the factors in the process of quality control

INFRASTRUCTURE		WEIGHT	DESCRIPTION
PRECISENESS		0,25	
Ratio -amount of passengers trains to number and category of tracks	%	0,042	The indicator represents the average assessment of commitment of the trips execution by the trains
Ratio -amount of freight trains to number and category of tracks	%	0,042	The indicator represents the average assessment of commitment of the trips execution by the trains
Maximum technical velocity of the railway network	km/h	0,042	The indicator represents the average assessment of technical level of the infrastructure
Permanent and temporary reduction of the train speed	h - annually	0,042	The indicator represents the average assessment of railway network efficacy
Plan of reconstruction works of the infrastructure	h - annually	0,042	The indicator represents the average assessment of rational utilization of the railway network
Average commercial speed of the trains	km/h	0,042	The indicator represents the average assessment of technology utilization of the train stations
SAFETY		0,35	
Total amount of incidents	Number per annum	0,07	The indicator represents the average assessment of the total number of accidents
Incidents caused by the infrastructure manager	Number per annum	0,07	The indicator represents the average assessment of the total number of accidents caused by the train stations dispatchers
Freight trains	Number per annum	0,035	
Passenger trains	Number per annum	0,35	
Technical issues during train movement	Number per annum	0,07	The indicator represents the average assessment of technical issues during train movement
Derailment	Number per annum	0,07	The indicator represents the average assessment of derailments.
Annual grade for safety provided by the inspector	Grade 1 to 5	0,07	

ACCESS TO INFRASTRUCTURE		0,15	
Total amount of train tracks	Amount	0,05	The indicator represents the average assessment of available capacity of the railway network.
Access to passengers trains		0,05	
Demanded railway lines	Amount	0,01	The indicator represents the average assessment of demanded railway lines
Offered railway lines	Amount	0,01	The indicator represents the average assessment of railway lines offers to the passengers
Completed railway lines	Amount	0,01	The indicator represents the average assessment of completed railway lines
Uncompleted railway lines due to infrastructure failure	Amount	0,01	The indicator represents the average assessment of extension railway network utilization
Uncompleted railway lines due to commercial provider failure	Amount	0,01	The indicator represents the average assessment of extension railway network utilization
Access to freight railways		0,05	
Demanded railway lines	Amount	0,01	The indicator represents the average assessment of railway lines demand
Offered railway lines	Amount	0,01	The indicator represents the average assessment of railway lines supply
Completed railway lines	Amount	0,01	The indicator represents the average assessment of constructed railway lines
Uncompleted railways lines due to infrastructure failure	Amount	0,01	The indicator represents the average assessment of extension railway lines utilization
Uncompleted railway lines due to carrier failure	Amount	0,01	The indicator represents the average assessment of extension railway lines utilization
ACCESSABILITY		0,1	
Services access for disabled people		0,1	
Railway services access	Amount of trains	0,05	The indicator represents the average assessment of accessibility from stand point of transport equipment according to disabled passengers needs
Train stations accessibility	Amount of train stations	0,05	The indicator represents the average assessment of accessibility for disabled people
RAILWAY MARKET		0,1	
Productivity		0,033	
Cost per train per km	Value	0,017	
Dotation per train per km	Value	0,017	
Status of assets	Value	0,033	
Costs for railway network works	Value	0,011	
Infrastructure amortization	Amount of planned interruptions of railway constructions	0,011	
Trains delays due to railway lines works	h - annually	0,011	
Financial situation		0,033	
Costs deviation year-to-year	Value	0,017	
Income/Costs	%		
Infrastructure access taxes		0,05	
Average taxes for access to railway lines per km	Value	0,05	

Source: Authors

Conclusion

The proposed model for quality assessment was implemented by the Ministry of Transport for the needs of rail transport in the Republic of Macedonia, used by the Agency for regulation of rail transport (Mitreva, E, et.al., 2016). Results are reliable and represent the basis for making a number of decisions to improve rail transport service.

Using a system of quality management leads to significant changes in public transport by clarifying the responsibilities and opportunities of all stakeholders in the process. To sum up the result of a specific event; they are highly dependent on momentary random factors such as rating ranks based on stable, long-term results. This is one of the ways to increase customer satisfaction and railways.

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