World Academy of Science, Engineering and Technology
International Journal of Industrial and Manufacturing Engineering
Vol:9, No:11, 2015

Dynamic Model Conception of Improving Services Quality in Railway Transport

Eva Nedeliakova, Jaroslav Masek, Juraj Camaj

***Abstract*—**This article describes the results of research focused on quality of railway freight transport services. Improvement of these services has a crucial importance in customer considering on the future use of railway transport. Processes filling the customer demands and output quality assessment were defined as a part of the research. In this contribution is introduced the map of quality planning and the algorithm of applied methodology. It characterizes a model which takes into account characters of transportation with linking a perception services quality in ordinary and extraordinary operation. Despite the fact that rail freight transport has its solid position in the transport market, lots of carriers worldwide have been experiencing a stagnation for a couple of years. Therefore, specific results of the research have a significant importance and belong to numerous initiatives aimed to develop and support railway transport not only by creating a single railway area or reducing noise but also by promoting railway services. This contribution is focused also on the application of dynamic quality models which represent an innovative method of evaluation quality services. Through this conception, time factor, expected, and perceived quality in each moment of the transportation process can be taken into account.

***Keywords*—**Quality, railway, transport, service.

I. Introduction

QUALITY of services in railway freight transport is possible to follow within the frame of all transportation chain or in division on its single stages. Very actual becomes problem to identification quality not only before start of transport and during it but also after ending transportation. At that time the customer often requires supplementary services, eventually, if the customer is not content with the transportation, he solves claim [1].

In term of breakdown of single characters of transportation exist within the frame of world and domestic researches several methods. For needs of search within frame of research carried on Department of railway transport, University of Žilina, Slovakia, was applied model, which take into account characters of transportation with linking a perception services quality in ordinary and extraordinary operation. Specifies the partial processes necessary at valuation of services quality offered, whereby are distinguish two different dimensions of quality namely routine dimension and dimension of especial condition. Both are possible watch also after realization transportation. The characters of routine dimension are typical for normal operation, when the service is provided in normal conditions [6].

Characters of dimension of especial condition customer expects in special situations only. It may be caused to weaker performance, a mistake by transporter as service provider, mistake caused by manager of infrastructure or exceptionality arises in connection with the necessity unusual access to customer, who requires this individuality [7]. These characters simultaneously include also supplementary performances in care for customer, which customer not expects, for example after completion of the transportation itself. Generally according research's expectations of customer, in order his specially requirements were solved quickly, are relatively low. In that case, arises the opportunity for transporter who can exceed expectations and leave the impression of good quality and high competences in solving problems [3].

New conception of improving services quality should use dynamic quality models which create a modern trend in quality management. Models follow the procedural character of the provided services that are unique, unrepeatable and constantly changing [4].

Important determinant for the customer when deciding about the use or non-use of the services of the transport company becomes the quality of provided services. Therefore, if we want to effectively assess the quality of services, it is necessary to take into account the time factor, which is possible through dynamic models that take into account the procedural character of provided services [10]. Consideration of the time factor is based on the recognition that customer needs and requirements, with respect to the services provided, are constantly changing.

These models ensure the perception of quality by customers and changes of their needs that develop over time. In the world are famous model Schostack, model Berry, model Stauss and Neuhaus, model Liljander and Strandvik and many others which hasn´t been used in practical operation within services of railway transport before their usage in the new research [2].

II. New Conception of Quality Improving

Selection of quality characters which was realized in accordance with algorithm as in Fig. 1. After detailed findings and search was this scheme used as so called map of quality planning, because quality planning underway continue in these systematic steps. There were defined six basic characters of quality in the research information, availability, reality,

Assoc. Prof. Ing. Eva Nedeliakova, PhD., is with the Department of Railway Transport, University of Zilina, Univerzitna, Zilina, Slovakia (corresponding author to provide phone: +421908456938; e-mail: eva.nedeliakova@ fpedas.uniza.sk).

Ing. Jaroslav Masek, PhD. and Ing. Juraj Camaj, PhD. are is with The Department of Railway Transport, University of Zilina, Univerzitna, Zilina, Slovakia (e-mail: jaroslav.masek@fpedas.uniza.sk, juraj.camaj @fpedas.uniza.sk).

flexibility, customer care, understanding and knowledge of customers.

Characters of quality were closer explained following way:

- Information = systematic providing of knowledge about the system of railway freight transport, which have to assist in the realization of acts after the execution of transportation.
- Availability = scope of the process in terms of time, frequency, geography and suitability of railway operation techniques.
- Reality = temporal, spatial and informational security of the phase after transportation, including ensuring the intactness of the consignment after transportation.
- Flexibility = speed of handling complaints in case other additional customer requirements after transportation, including exact invoicing of fees for transportation.
- Customer care = reinsurance of operations related with unloading of consignment in destination station, solution the problems that arise after the end of the transportation.
- Understanding and knowledge of customer = help and support customer needs, knowledge of customer needs [6].

Fig. 1 documents the activities, which were within the frame of research realized and served on identification of customers, determination to needs of customers and processes, which are able to reach required quality.

Fig. 2 characterizes a sequence of steps that were made within application of the methodology in real conditions of the transport market.

One of the mentioned methods for evaluation of services quality is a model Stauss and Neuhaus. It is not based on a general statement that a high degree of satisfaction automatically leads to high customer loyalty, where the main reason is diversity of customers´ needs, situational factors and also the attractiveness of other alternatives [5].

In research of qualitative model of satisfaction is not enough rating of global (overall) satisfaction but much more is needed the detection of potential threats among the satisfied customers.

Model distinguishes customers into 5 categories and stresses that the perception of service quality is constantly changing [9].

In the model Staussa and Neuhaus, we distinguish three types of satisfied customers and two types of unsatisfied customers:

- Satisfied customer with growing requirements. This customer is characterized by high satisfaction with the service provider. Requirements of customer constantly growing up and company must try to satisfy these requirements.
- Stably satisfied customer, which is characterized with passive behavior. The company is not forced raise the performance.
- Resignedly satisfied customer, which manifest the some indifference towards relation to company. This attitude can be caused by lack of different alternatives.
- Stably unsatisfied customer, which manifest a low level of activity and he is unsatisfied with service of company.

Unsatisfied customer with growing requirements shows his dissatisfaction towards service provider. The customer should not choose this provider of service again.

When the customer is satisfied, it does not mean that it will be forever, it depends on many factors when his decision about using of railway transport may change. Fig. 3 characterizes division of customers according its new approach.

The disadvantage of original model Stauss and Neuhauss is that the model not considering with determining the criteria of evaluation [6]. For this reason were the principles of model and research for each specific customer of railway freight undertaking and customer specific rail freight carrier supplemented by the evaluation criteria. The research involved 2930 cases of cargo manipulation, and 140 participants at 20 different line sections.

Criteria were divided into type of wagon, technical condition of the wagon, -time necessary on placing of empty wagons at disposal, delivery time of loaded wagon after loading, time of placing wagon on unloading and delivery time of empty wagon after completion unloading, cleanness of wagon. Results of the research with adapted criteria are characterized as in Fig. 4.

III. Assessment of Quality Characters

Selection of characters within the frame of research come from practical operation, from experience with contact with customers, according their interest, what are their requirements, needs, what factors are attractive for them, what watching with deciding about utilization railway freight transport and purpose-built units structure formally organized railway company [9].

The individual railway stations and opportunities of fulfillment services quality were assessed through point rating scale, which uses 101 points, from 0 to 100, to measuring "micro pushing" level of quality processes filling requests of customer. This scale for phase of transportation chain after transportation is mentioned in Table I. Every railway station could reach a maximum of 100 points, and each process needed to ensure quality service was worth 10 points.

TABLE I
Rating Scale

Number of points	Quality level [a]
0-20	unsuitable quality
21-40	partially suitable quality
41-60	standard
61-80	over standard
81-100	fully suitable target quality

Characterized by way rating were monitored not only transporter services, as well as with them related equipment railway stations and it according to mentioned the data for a period of one year, when have been identified gaps in exactly defined quality characters [9].

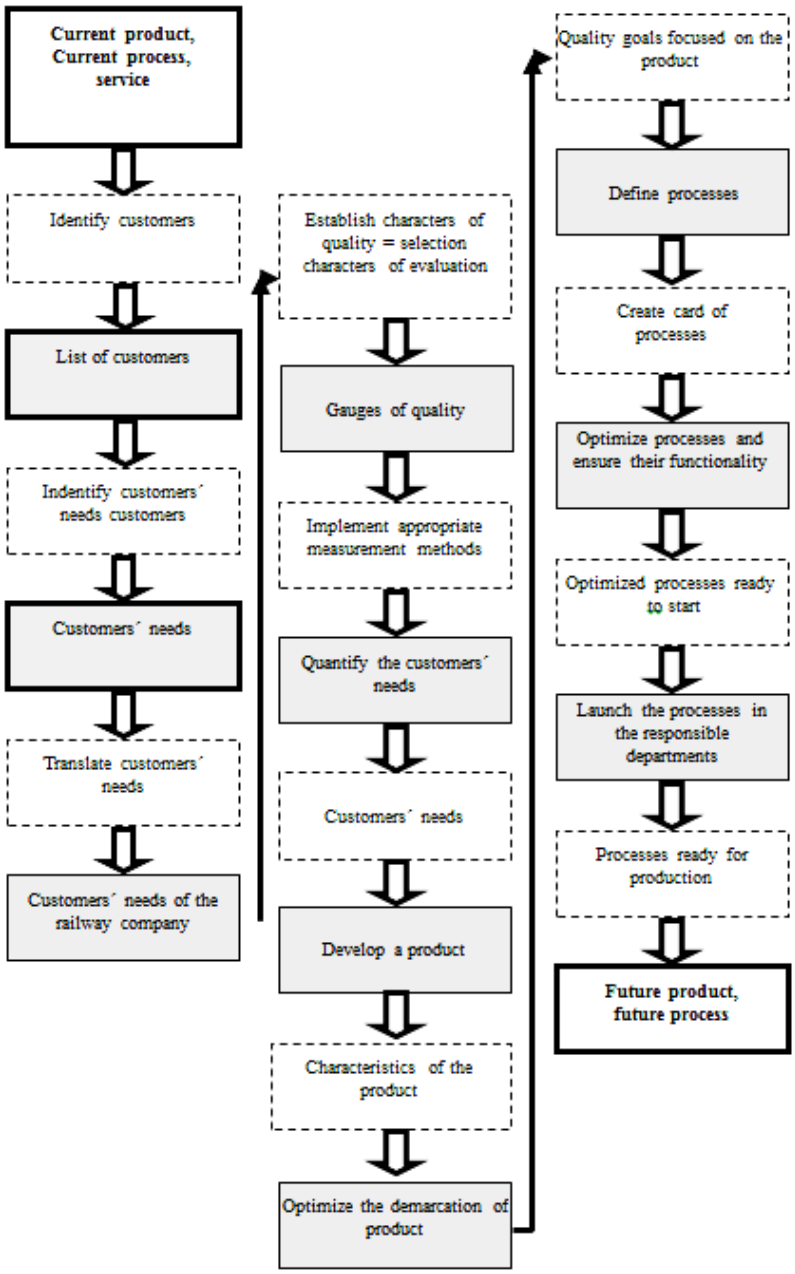

Fig. 1 Map of quality planning with selecting characters of evaluation

IV. Conclusion

Providing of complex services and tailoring of specific solutions is not only the way how to survive in strong competition but also the way how to find and keep a stabile customer.

Suitably chosen methodology for improving services quality and for identifying the level of quality of transportation services must meet the requirements in the environment transportation market and in specific examples, for a selected stations and track sections to provide relevant results.

Fluctuations at commodity markets and development of exchange rates of the main global currencies influence to a huge extent the volume and direction of flows of load on the global scale.

This methodology allows monitoring quality of processes provided throughout the transportation chain, therefore before the realization the transportation, during it and after the ending of the transportation. In addition, this new conception of improving quality services in railway transport enables immediate reactions to rapidly changing market environment, especially in relation to customers' needs [6].

Among the basic advantages which bring using of dynamic quality models belong mainly provisions of documents for improving the quality plan, analysis or processing [8]. From the economical point of view, the customer is always the one who need to spend certain funds and he expects adequate quality of services, in order to be his needs met. Therefore, there must be a corresponding ratio of quality and price.

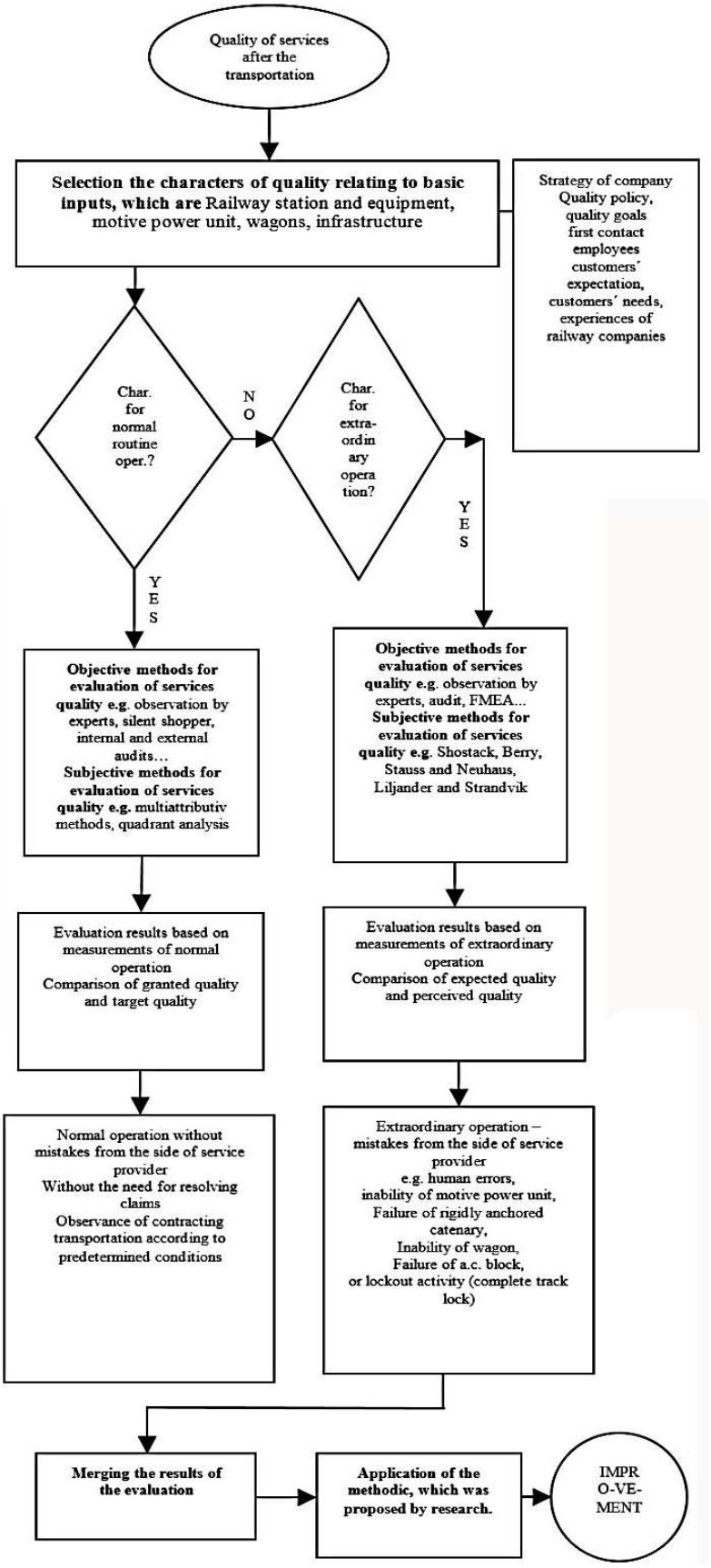

Fig. 2 Algorithm of applied methodology

The dynamic model conception respects systemic approach, which leads to the prevention of poor quality, reduction the losses which are caused by non-quality of system, help to increase customer satisfaction and control system of service quality in railway company [6].

Dynamic models allow taking account of a process character of provided services respecting the expected and perceived quality from the customer's perspective. The universal models can be used in any industry or company. Models provide interesting and new perspective on service quality and show often hidden bottlenecks throughout the process of providing service.

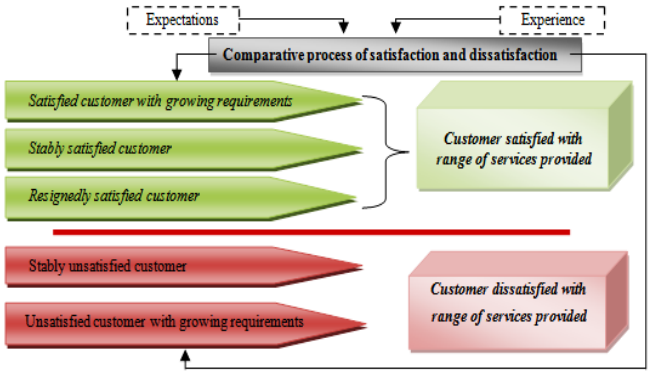

Fig. 3 Customers division

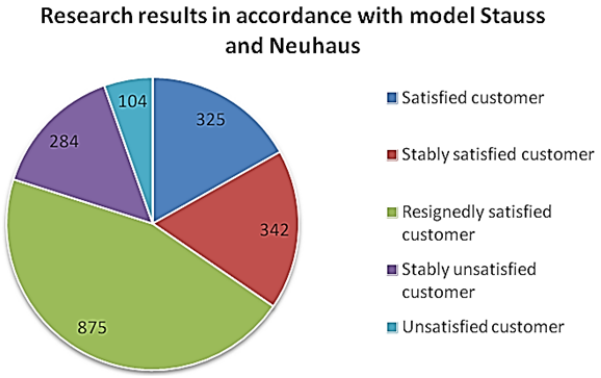

Fig. 4 Research results with adapted criteria

ACKNOWLEDGMENT

This paper is prepared with the support of the project **"The quality of education and development of the human resources as pillars of the knowledge society at the Faculty PEDAS"**, ITMS project code 26110230083, **University of Zilina**.

Modern education for the knowledge society / Project is co-financed by funds from the EC

Európska únia

REFERENCES

[1] A. Dolinayova, J. Camaj, M. Loch, "The Effects of Logistical Centers Realization on Society and Economy", World Academy of Science, Engineering and Technology, International Science Index, Economics and Management Engineering, 1(4), 2014, p. 2613-2617.

[2] D. Hrašková, V. Bartošová, "Critical factors of Managing Change in the transport company," in *Economics - Management Spectrum: scientific journal of Faculty of Operation and Economics of Transport and Communications*, 7th ed. vol. 2, University of Žilina in Žilina, 2013, pp.51-55.

[3] E. Nedeliaková, A. Dolinayová, I. Nedeliak, "Methods of evaluation of the transportation services quality", University of Žilina in Žilina, EDIS, 2013.

[4] I. Kubasáková, M. Šulgan, "Modern logistic system – effective customer response (ECR)" in *Transport and communications*, University of Žilina in Žilina, 2005, pp. 5-10.

[5] J. Camaj, A. Dolinayova, J. Lalinska, M. Bariak, "The Technological Problem of Simulation of the Logistics Center", World Academy of Science, Engineering and Technology, International Science Index, Economics and Management Engineering, 1(4), 2014, p. 2618-2622.

[6] J. Camaj, J. Lalinska, J.Masek, "Simulations of continental logistics center from the perspecive of gechnlogist" in *ICIMSA 2014 International Conference on Industrial Engineering, Management Science and Applications 2014*. Proceeding book of conference. Beijing: IEEE, 2014, p. 305-308.

[7] J. Majerčák, I. Nedeliak, "Practical experiences with modeling of IT systems and business processes," in *6th Forum of rail transport*, Bratislava, 2010, pp. 81-84.

[8] J. Sekulová, I. Nedeliak, "Utilization of GAP model in providing of services in the railway freight transport," in *Perner´s Contacts*, 8th ed. vol. 4, 2013, pp. 67-75.

[9] KEGA 026ŽU-4/2015 "Innovative approaches in system of teaching management in the study program Railway transport with a focus on application the dynamic quality models in the railway transport", University of Žilina in Žilina, 2015.

[10] M. Poliak, "Current problems of procurement of transport services by public passenger transport," in *Current problems in transport 2009*, Pardubice: Institut Jana Pernera v Praze with Přepravní laboratoří Dopravní fakulty Jana Pernera, 2009, pp. 213-218.