

TATIANA MOLKOVÁ, Ph.D.

E-mail: tatiana.molkova@upce.cz

IVO HRUBAN, Ph.D.

E-mail: ivo.hruban@upce.cz

University of Pardubice, Jan Perner Transport Faculty,  
Department of Transport Technology and Control  
Studentská 95, 532 10 Pardubice, Czech Republic

Traffic Policy

Preliminary Communication

Accepted: July 20, 2012

Approved: May 23, 2013

# MODELLING COMPENSATION POLICY FOR QUALITY AND DELAY DETERIORATION IN RAIL TRANSPORT

## ABSTRACT

The paper deals with the customers' claims on provided services during train delay in personal railway transport. There is comparison between the situation in the Czech Republic (Brno main station) and Austria (Wien Westbahnhof) in the paper. The development of the compensation policy cannot be based only on customer requirements. If the railway company focuses on providing compensation for delays, it must follow its economic balance. However, as the passengers' opinion survey showed, the negative impact of delays can be reduced by providing adequate information to passengers. Based on the passengers' opinion survey, it is necessary to consider the Regulation 1371/2007/ES as the minimum of the possible and on the basis of this reasoning to compile a compensation policy. The costs associated with compensation for the delay should be divided according to the causes of the delay among the individual culprits, so that railway undertakings bear the responsibility even for delays arising from reasons that are beyond the control of the railway undertaking itself.

## KEY WORDS

quality, railway transport, delay, compensation, modelling

## 1. INTRODUCTION

With the rising standard of living of the population, the pressure to provide quality services is growing. One of the critical parameters of transport as a service is time. Time is evaluated in both passenger and freight transport, although differently in each of them.

The basic parameter that contributes to selecting the mode of transport for implementing the planned transportation is the reliability with which a timetable is made. It is observed in both passenger and freight transport. Delays arise from a variety of reasons and it is not possible to eliminate them absolutely; therefore, it is necessary to focus on compensations to custom-

ers in case of delays. This fact is known to the European Parliament, and therefore since 2004 directives have been passed to ensure the rights and obligations of passengers in transportation.

One of the goals in the research oriented to the quality of passenger transport [1] was both to identify measures improving the perceived quality of the passengers within train delay and to propose a model of compensation policy. The starting point was data obtained from passenger surveys. Some results and conclusions are presented in the paper.

## 2. QUALITY OF TRANSPORT

Quality of transport is a part of the overall view of quality and approach to it. Quality of transport consists of two units, which are quality of transport and quality of shipping processes. Quality of transport itself is a part of the general quality [2]. Links within quality are shown in Figure 1.

The view of the quality in transport has developed over time as it did in terms of quality in general. The beginning of assessing the quality of transport started in 1950s. The biggest development of quality evalua-

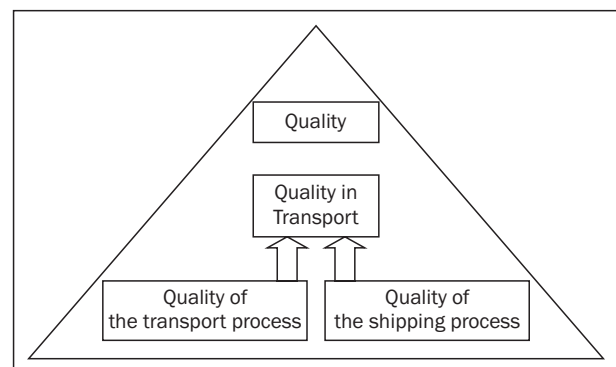


Figure 1 - Links within different levels of quality

tion in the transport companies has taken place only in the recent years. This is due to the emergence of competition among individual transport modes. Since then, there has been an effort to secure an appropriate level of quality of transport services provided.

The quality of transport services in the transport sector in the Czech Republic is governed by standards CSN EN 13816:2003 [3], EN 15140:2006 [4] that extend ISO 9001:2001 standards to the field of transport.

The European standard CSN EN 13816:2003 [3] defined the quality criteria of availability, accessibility, information, time, customer care, comfort, safety and environmental impact. The exact procedures for measuring quality by the individual criteria are included in the directive EN 15140 [4].

In terms of quality, time can be observed in several levels:

- Time of departure and arrival;
- Time spent on the road;
- Delays.

The first two levels of perception of time as a quality criterion serve for the customers to decide whether to use a particular transport services. Generally, we can say that the time of arrival is crucial. In the passenger transport, it is also the time spent on the road in a vehicle, or more precisely in the transport system.

Delays then reflect the reliability of the system to transport passengers and goods on time to the right place. Passengers are variously sensitive to delays with regard to the purpose and length of their journeys. Delays play an important role in case of freight too where the modern logistics systems JIT and JIS require precise delivery of materials and delays are undesirable. Another factor influencing the demands on the accuracy of transport can be transshipment to another mode of transport and the limited capacity of the transport infrastructure of the transshipment terminal.

Customer demands in freight transport are influenced by many factors, depending always on the production and distribution strategy of the respective company what parameters to prioritize for their shipping.

Passengers are very sensitive to delays. And those do not have to be just delays by which they are actually affected, but also perceived potential for delay. In such cases, passengers often change the transport mode. Passengers then switch between equivalent modes of transport; within the context of the Czech Republic it is between buses and trains. The sensitivity of passengers to alleged delays is dealt with in some studies. Here the article *Transports Metropolitans de Barcelona* [5] should be highlighted, in which the author states that the interest in public transport is directly proportional to the length of delay. The author points out the high sensitivity of passengers even in cases of anticipated delays in cities, specifically in Barcelona.

This paper was published in 1993; its permanent actuality can be documented with a study carried out by *Arbeitskammer Wien* [6] in Vienna in the spring of 2010.

A study [6] of use of individual modes of transport during the renovation of the railway junction *Wien* found that 16% of daily commuters switched from S-Bahn lines to cars. This represents an increase of 9,000 car drives around the city and its surroundings in comparison to the previous period. The change of mode on the commuters' side was due to extension of travelling times and expectations of complications and delays in rail transport during the renovation of the railway junction *Wien*. Other factors of the dissatisfaction were the lack of information provided with the delay, long transfer times, and squalor in vehicles. [6]

### 3. DELAYS ON RAIL

Delays in railway operations have always had a number of causes, be it on the technical or technological side or that of third parties. During the year 2010 the reasons of train delay in the Czech Republic were the following [7]:

- Other reasons ..... 40.5%
- Fault on infrastructure ..... 20.0%
- Waiting for connection ..... 18.3%
- Commercial reasons (boarding, unloading).....9.6%
- Fault of engines .....5.0%
- Fault of interlocking system.....2.8%
- Late arrival from abroad .....1.5%
- Fault of traction equipment .....1.0%
- Traffic reasons .....0.8%
- Fault of vehicles.....0.7%

Self studies were realised to find out the main reasons of delay according to the frequency of commuting in dissertation thesis [8]. The results are shown in *Table 1*.

In the context of market liberalization, various companies are responsible for individual delays of technical and technological nature (infrastructure managers, railway companies, traffic control companies). Due to this, the issue of delays is very extensive. The complexity of relationships in the quality of rail transport is shown in *Figure 2*, which illustrates the links between transport infrastructure manager, railway undertaking and customer.

Because public transport is not to be understood in a modern society only as a social service, we need to know the passengers' requirements for services provided and their relationship to delay.

The rights of passengers in the rail transport in cases of delays are governed by Regulation 1371:2007 of the European Parliament and Council. In addition to delays, the regulation provides for the rights of the passengers in case of cancellation of trains. This regulation as well as others of the European law must be

Table 1- Percentage range of delay reasons according to frequency of commuting

	Commuting every work day		Commuting twice a week	
	2009	2010	2009	2010
Different train set	3	0	0	0
Closure	20	9	18	10
Late arrival from foreign state	12	14	20	10
Train crossing	7	6	8	10
Train overtaking	5	8	1	0
Fault of infrastructure	5	1	6	5
Fault of interlocking system	1	1	1	5
Modernisation of infrastructure	7	5	8	0
Traffic reason	11	9	2	10
Accident	1	2	3	0
Following ride	10	11	20	35
Waiting for connection	8	17	7	5
Passengers indiscipline	1	1	0	0
Weather	5	6	0	0
Fault of vehicles	2	1	3	5
Diversion	1	1	0	0
Frequency	0	2	1	5
Fault of engine	0	2	1	0
Turn around	0	5	1	0
$\Sigma$	100	100	100	100

Source: 7

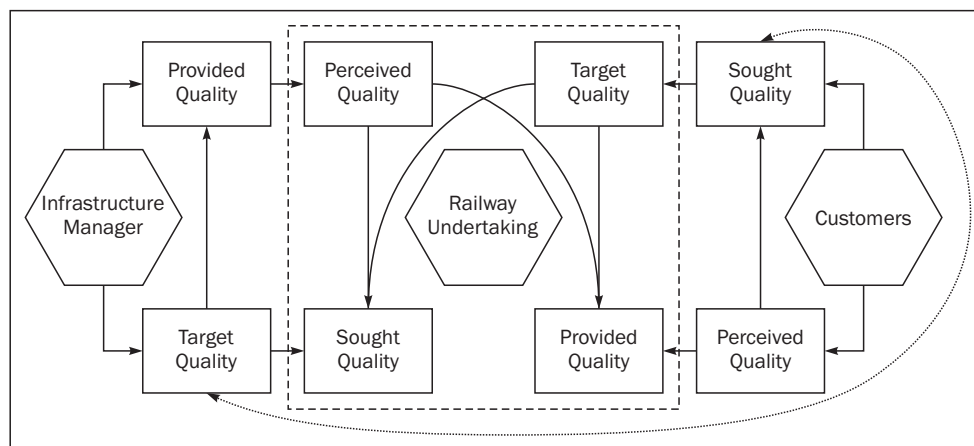


Figure 2 - Qualitative links between entities in rail transport

subject to approval by the relevant government authorities in individual member countries.

The regulation provides rights to passengers from the transport contract with a delay of more than 60 minutes. Passengers shall be provided with a refund, re-routing and postponement of travel or dual-rate financial compensation [9]:

- 25 % of the ticket price for a delay of 60 to 119 minutes;
- 50 % of the ticket price for a delay of 120 minutes or more.

The passengers who hold a travel pass or season ticket and who encounter repeated delays or cancellations during their validity may request adequate compensation in accordance with the compensation arrangements in force in the rail company. The railway company is also imposed an obligation to provide refreshments for passengers, rail replacement transport, and if necessary an overnight accommodation under the conditions laid down by the regulation [9].

In the Czech Republic, however, an exception was negotiated to the validity until 2014 [10]. At present,

Table 2 - Comparison of the categories of trains

Company	Train Category						
ČD, a. s.	Os	Sp	R	IC	EC	EN	SC
ÖBB	S, R	REX, RSB	D	IC, OIC	EC, OEC	EN	RJ, ICE

Table 3 - Percentage of the respondents' representation

Frequency of commuting	Brno hl. n. representation in %	Wien Westbahnhof representation in %
Daily (at least 8 times a week)	14	7
Weekly (at least twice a week)	53	18
Monthly (at least twice a month)	18	32
Irregularly (less than twice a month)	15	43
$\Sigma$	100	100

this regulation thus applies in the Czech Republic only to international transportation. Although the Regulation [9] in the Czech Republic, the Czech Railways, JTC provided passengers of higher quality connections from 20 September 2010 with at least partial compensation, which covers variations caused by the railway undertaking (relevant delays, different marshalling, non-functioning heating / air conditioning) [11]. With the advent of the Timetable 3010/2011, only passengers of SuperCity category trains (SC) are entitled to compensation in the national transport [11].

### 3.1 Passengers' opinion poll

The best way to obtain information about customer satisfaction with a product that is being offered in transport is a questionnaire survey. The interviews can be realised during downtimes, while the passenger are waiting for a connection or clearance. Ideally, a survey can be conducted during the journey onboard the vehicle.

A questionnaire was compiled within a research at the University of Pardubice to determine the sensitivity of passengers to delays and their requests for services during the delay. The formulation of questions was tested by the authors with fourth year students of Transport Technology and Control – transport systems at Jan Perner Transport Faculty, University of Pardubice in the subject Quality of transport and shipping processes. The next step was to prepare a German version for ÖBB clients and this had been discussed with students of the Technische Universität Wien.

In the survey, the passengers were asked questions on the following topics:

- How often do you use a train?
- What is the most common reason for your trip?
- What category of train do you use most often?
- How much delay are you willing to tolerate?
- What kind of reporting on delays do you prefer?
- Is the reason of delay important to you?
- And in case of a longer delay, what compensation would you like to get?

In compiling the questionnaire, different categories of trains in the Czech Republic and Austria had to be taken into account. The different categories of ČD, a.s. (Czech Railways) trains were assigned with the following categories of ÖBB trains, see Table 2.

By courtesy of ÖBB Netzbetrieb, ČD a.s. and Brno New Station Development, a. s., measurements were taken at railway stations Westbahnhof Wien (Austria) and Brno hl.n. (the Czech Republic). The surveys were conducted at both stations during the rush hour on Friday in the late spring and early summer 2010 (Wien Westbahnhof), and in the late summer and early autumn 2010 (Brno hl. n.). There were 603 responses obtained at both stations. Thus 1,206 passengers were interviewed.

The railway station Wien Westbahnhof was chosen out of the Vienna stations because of the elimination of foreign passengers' influence, especially Czech passengers, on the course of interviews (in the Wien junction, passengers from the Czech Republic to Austria make use of the station Wien Simmering, Wien Meidling, Wien Südbahnhof, possibly Wien Praterstern) and also the station is one of two stations in the Vienna junction with the stops of the prestigious RJ and ICE connections.

The railway station Brno hl. n. was chosen by the authors for its resemblance to the station Wien Westbahnhof.

### 3.2 Measurement results

The evaluation of the measurement results was carried out first for both countries separately and then possible intersections were searched for.

The percentage of respondents by the frequency of trips during the measurement at the station in Brno hl. n. and Wien Westbahnhof is shown in Table 3.

Individual percentage when travelling for individual activities for each frequency in the Czech Republic is shown in Figure 3.

The analysis of reasons for commuting by the frequency confirmed the expected distribution of reasons

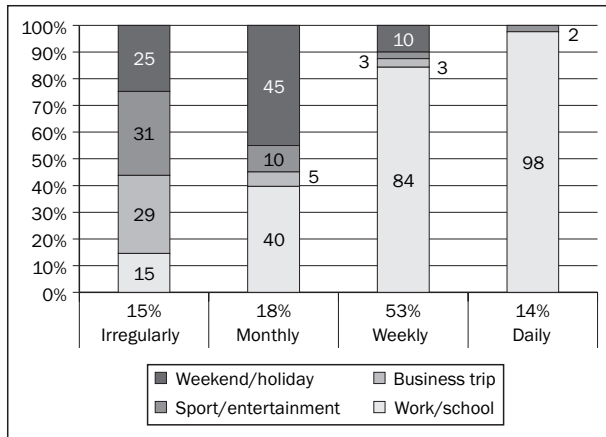


Figure 3 - The percentage of commuting and reasons in the Czech Republic

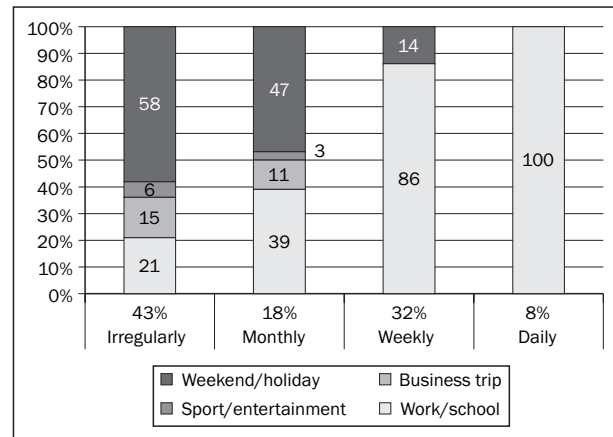


Figure 4 - The percentage of commuting and reasons in Austria

for using trains. The smallest group of passengers surveyed consists of daily commuters travelling to work and schools. This is due to the existence of a well-functioning integrated transport system around the City of Brno. Before coming to the station, the passengers had checked-in in the public transport vehicles, or they had purchased a season ticket and do not stay in the premises of the station. The survey did not find any anomalies in the distribution of reasons for the trips within each frequency.

The situation was similar in Vienna, where there is also the smallest number of respondents from the group of passengers commuting daily. In Austria, a system of integrated suburban traffic is in operation and, moreover, ÖBB season tickets are widely used by regular passengers as they significantly reduce the price of commuting to work and school. Therefore, regular passengers practically only pass through the Wien Westbahnhof station, and thus it was very complicated to have the questionnaires filled by them.

However, the ratio of the daily commuters to all respondents is significantly smaller than in the case of the Czech Republic (7% to 14%). This disproportion is due to the fact that many passengers in Brno go shopping on Friday before leaving for their homes, and fail to come to the train on time.

The situation in Austria is described in Figure 4. And even here there are no deviations; however, if compared to the situation in the Czech Republic, there is a group of passengers travelling for sport missing in the daily commuters group. This phenomenon can be explained by the fact that youth from the surrounding area meet in Brno for training in sports clubs.

Apart from the general view, in terms of appropriate quality, it is appropriate to monitor passengers using the highest quality trains. In the conditions of the Czech Republic, these are passengers using Pendolino train for their trip while in the conditions of Austria these are passengers travelling by the ICE and RJ trains.

Before evaluating the results for the passengers travelling with the highest quality trains, it is necessary to mention the fact that in the Czech Republic the passengers who travelled exclusively with the SC category trains were not interviewed. That could be partly due to the implementation of the survey in the Brno hl. n. station that lies off the main axis of the journeys of these trains (i.e. Prague - Ostrava). Still, passengers travelling by the SC trains could be traced in the group of high quality trains and the group of passengers who do not care about the category of trains as the time of arrival at the destination is more important for them. The percentage of the passengers using SC trains is just 5% (of which 1% relates to the passengers of higher quality trains and the remaining 4% are supplemented by passengers who do not care about the train category when travelling).

Figure 5 just illustrates the situation referred to in the preceding paragraph. Since it is not purely an SC train category, it can be stated that the result is once again expectable. With our southern neighbours, however, the situation with the use of highest quality trains is better. One of the reasons why we managed to win respondents using exclusively the ICE and RJ category trains can be that in addition to the high quality services offered onboard it is by far the fastest connec-

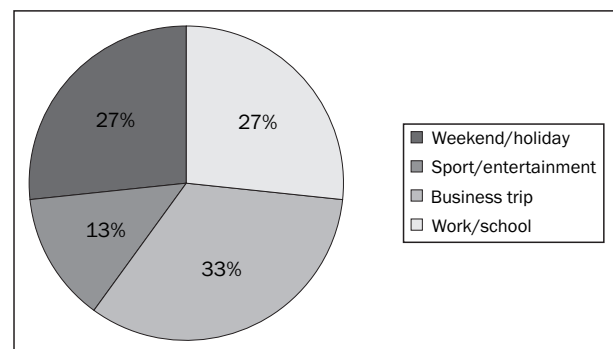


Figure 5 - Reasons for trips of passengers using SC trains

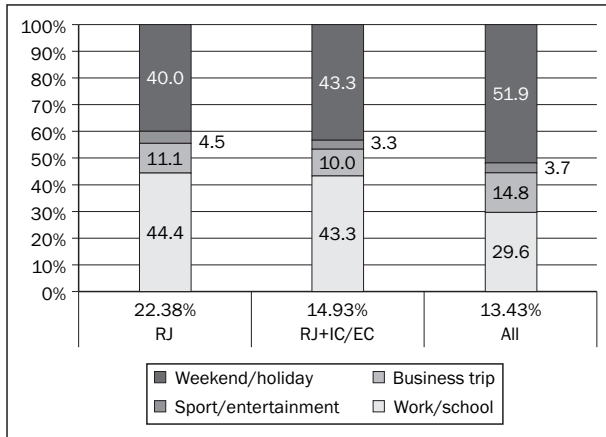


Figure 6 - The percentage of distribution of destinations of the Austrian passengers traveling by ICE and RJ trains

tion between cities at no extra charge. The situation in Austria is shown in Figure 6.

The graph in Figure 6 is more complex than the Czech situation. For each category and frequency of commuting, for the sake of convenience and comparison with the situation in the Czech Republic, there are percentages given throughout this group of trains. Individual categories of the questionnaire are indicated in the Figure as follows: the passengers using exclusively RJ trains or ICE are marked in the RJ column. The results for the passengers using, in addition to RJ and ICE trains, the higher quality trains (herein EC, OEC, IC, OIC and EN) are summarized in the RJ + EC / IC column. And the last column labelled as "all" sums up the passengers who chose a train by the arrival time rather than by category.

The proportion of the passengers who use the services of RJ or ICE trains, as the case may be, in the total number of the passengers surveyed is almost 51% (representing more than ten times the proportion in the Czech Republic). While in the Czech Republic using SC trains is still seen as a prestigious matter, in Austria the ICE and RJ connection are viewed as ordinary train

categories that everyone can afford. A significantly low share of passengers bound for fun and sport is understandable in this case, given the large inter-stop distances run by the RJ and ICE trains.

#### 4. RECOMMENDATION FOR THE SETTING OF COMPENSATION POLICY

The information provided in Section 3.2 is of particular importance for the completion of the overall picture of the structure of the commuters surveyed in the Czech Republic and Austria. In terms of setting a compensation policy, particularly important is the information regarding the sensitivity of passengers to delays and their idea of a possible compensation for a delay they may encounter on the way.

With respect to the paper, two questions are decisive:

- How long delays are the passengers willing to tolerate?
- What compensation would they like to get for delays longer than acceptable?

In the survey, the passengers had a choice of several fixed ranges of delays or they could determine their own threshold tolerated. Comparison of the situation in the Czech Republic and Austria is given in Table 4.

In both countries, the statistical values of this set are exactly the same, the mode and median values are equal to 10 minutes, the weighted average for the Czech Republic is 13.2 min and 13.3 min for Austria. As a tolerable delay limit for compensation cases the value of 10 minutes should be considered. It is also interesting to evaluate the situation in terms of frequency and commuting distance. By these criteria, the delay was monitored by the average, median and mode. The frequency of commuting and its effect on the tolerable delay limit is shown in Table 5.

In both countries we could see that the more often the passengers commute, the shorter delays they are willing to tolerate. To illustrate the situation, it is

Table 4 - Rate of acceptable delays

Country	Min.	How long delays are you willing to tolerate									
	0	5	6	8	10	15	20	30	40	60	
Czech R.	30	92	0	0	207	156	82	22	2	12	
Austria	9	84	3	3	264	141	75	3	3	18	

Table 5 - Impact of the frequency of commuting on the tolerable delay limit

	Czech Republic				Austria			
	mean	median	mode	%	mean	median	mode	%
Daily	12.1	10	10	17.9	8.7	10	10	40.0
Weekly	13.8	10	10	19.5	12.4	10	10	17.1
Monthly	14.2	10	10	20.8	11.9	10	10	14.5
less than twice a month	15.7	10	15	32.1	15.9	15	12.5	14.0

Table 6 - Impact of the distance on the tolerable delay limit

	Czech Republic				Austria			
	mean	median	mode	%	mean	median	mode	%
up to 50 km	12.9	10	10	21.4	8.8	10	10	35.7
up to 100 km	12.4	10	10	19.9	14.2	10	10	15.0
up to 150 km	12.6	10	10	22.8	16.9	15	12.5	3.4
over 150 km	14.4	15	13	18.2	13.4	10	10	15.3

worth mentioning how many percent of the passengers would not tolerate the 10 minutes limit, i.e. the percentage of the passengers who are only willing to tolerate a delay of less than 10 minutes. These values are listed in the column marked with the percent.

Likewise, the assessment is made for the distance to which the passengers commute, see Table 6.

Here, it is interesting to see the lower sensitivity of the Czech passengers to delayed trains in relation to the distance travelled. This can be simply explained by the fact that the Czech commuters travelling to a distance of 50 km commute in 43% of cases both daily and weekly. While in Austria, the commuting distance extends with the decreasing frequency (daily up to 50 km - 39% weekly up to 100 km - 30%, and the other two categories of passengers travel most often over 150 km - 48% and 53%).

In the survey, the passengers were also asked questions about the quality of services provided. The information about the delay with a five-minute tolerance (meaning that the train is delayed by 5, 10, 15, 20, 25 etc. minutes) suits the passengers in 50% of the cases, 32% of travellers prefer accurate reports, the remaining 18% of those surveyed do not care about the way delays are announced. The situation is different in Austria where passengers are accustomed to accurate reporting; 54% of respondents preferred accurate reporting, 31% of passengers reported that they are fine with the five-minute tolerance and 15% do not care about the way of reporting.

Although the results are contradictory in both countries, most passengers justified the choice with a five-minute tolerance by the fact that at the point of delay, the duration of the delay cannot be sufficiently accurately estimated. In the Czech Republic, an incorrect length of the reported delays was stated by all passengers regardless of the distance, where they were from the place of delay occurred.

Interesting additions were given even in case of the question whether to give the reason for the delay. Fifty-one percent of passengers in the Czech Republic consider the reason for the delay to be important. Passengers, however, want to know the exact reason for the delay (not just information "operational reasons"), stating that if a death of a person or a serious accident occurred, they would prefer a general reason, such as "extraordinary event on the track."

In Austria, the information about the delays is considered important by 57% of respondents. In both countries, the regular passengers agreed that with the reason given for the delay they are better able to assess the situation.

Like Section 4, this Section also includes the results of the interviews with passengers travelling by SC or RJ trains.

Five-minute tolerance information is acceptable for 73% of the passengers travelling by these trains, and only 20% of the respondents would like to see accurate information whereas for 7% of the cases the way the information is presented is irrelevant. The reason for the delay is a matter of interest only for 47% of the passengers using the SC category trains. These passengers use train irregularly and not often, for that reason they are not able to imagine further development of situation on the route.

In Austria, 58% of the passengers using the RJ category train (exclusively RJ only 67%) expect accurate reporting, 28% (20%) of these passengers prefer a five-minute message of tolerance and for 13% the reporting form is not decisive. The reason for the delay is a matter of interest for 57% (51%) of the surveyed passengers using the RJ category trains.

## 5. COMPENSATION POLICY

The basic rules for determining the compensation are given by Regulation 1371:2007 [9] which sets the amount of damages. The survey asked the passengers also about the method of compensation in case of delays. Table 7 shows the results.

Of the options offered to passengers in both states, the passengers would be interested in some form of financial compensation, either a kind of discount or direct financial compensation. The respondents choosing discounts expect it to be arranged more easily than in case of the return of the fare.

It is worth noting that in neither country are the passengers satisfied with the current system of compensation. However, in Austria the tariff [12] incorporates the Directive 1371:2007 [9]. The result is caused by the gaps in compensation for passengers with a season ticket, who will receive compensation under the overall situation on the track rather than by how much they are really affected by the delay, and only if they

Table 7 - Percentage of compensation options according to all passengers

In case of longer delays, the passengers would welcome:					
Country	Financial compensation	Discount on the next ticket purchased	Refreshment	The current system suits them	$\Sigma$
Czech R.	45.9	36.8	10.3	7.0	100.0
Austria	38.3	41.8	10.9	9.0	100.0

Table 8 - Analysis of the requirements of passengers using trains of the highest quality to compensation for delays

Train category	Financial compensation	Discount for the next purchased ticket	Refreshments	The current system suits them
RJ	45%	42%	11%	2%
RJ+EC/IC	37%	40%	10%	13%
All	48%	37%	7.5%	7.5%
$\Sigma$	43%	40%	10%	7%

are the owners of the annual line ticket [12]. In the Czech Republic at the time of the survey, a regulation was in force for the domestic transport [10] ensuring the right to compensation to passengers travelling by trains of higher quality.

Passengers using higher quality trains would welcome a financial compensation in 47%; 20% of the respondents would welcome refreshments, or are satisfied with the current state. Only 13% of the respondents want a discount on another ticket. These results are just confirmation of the expected. Most passengers of the SC category trains use trains for business trips (53% of respondents) when their travel expenses are covered by their employers. Furthermore, these passengers do not travel too often (33% of the respondents said that they travel by train less than twice a month), and therefore they do not find a discount for the next ticket sufficiently appealing.

In Austria, the situation is as follows - 43% of the passengers would welcome financial compensation, 40% a discount on the next ticket, 10% of the passengers would like to have refreshments in case of delays and the current situation suits 7% of passengers. A more detailed analysis is shown in Table 8.

The survey showed that the compensation policy should include informing the passengers. Passengers are willing to tolerate delays up to 10 minutes. Any delay beyond this limit is usually perceived negatively by the passengers. Passengers also need accurate information about the reason and anticipated length of the delay.

Therefore, the railway undertaking should consider ways of compensating passengers for the delays in excess of 15 minutes inclusive. The value of 15 minutes is chosen as the ideal for any compensation because it is sufficiently far from 10 minutes to resolve any disputes about the length of delays.

The compensation should take into account the following recommendations:

- The compensation scheme should not forget regular passengers with a season ticket (the scheme should not be based only on average line values, because such compensation schemes are deemed by passengers discriminatory and wrong).
- The settlement of compensation should be simple. If it is not possible to implement such a system without high costs, the focus should be on informing the passengers in case of emergencies. Passengers tolerate better the delays when they are informed about the exact cause of the delay and the expected duration (see Section 4).

## 6. MODEL EXAMPLE FOR PASSENGER TRANSPORT OF THE CZECH RAILWAYS

Compensation for passengers in accordance with Directive [9] is conditioned not only by the length of the delay, but also by the size of the refund. If the directive was applied to domestic transport in the Czech Republic, the railway undertaking should pay the passenger a refund if its amount is at least €4 of the fare (i.e. an amount of approximately CZK100 – with the exchange rate €1 = CZK25 for simplicity).

The current ČD a. s. (Czech Railways) tariff [11] reads that this refund represents the value of CZK400 ticket in case of delay in the range of 60 min. to 119 min. or CZK200 for a delay of more than 120 min. The specific price and tariff distance according to ČD a. s. tariff [11] are given in Table 9.

That the €4 limit is widely applied is evidenced by tariffs of the Austrian Railways [12], Slovenian Railways [13] and also of ČD.

As shown in Table 9, it would be appropriate to reduce the limit for the Czech Republic. The In-Card column represents the reduced fare for customers with In-Card. The issue of compensating for any deviations from the timetable needs to be addressed according to the needs of passengers with a link to the economic



Table 9 - Minimum value of the ticket for obtaining a refund

1 <sup>st</sup> class	Kilometre distance	Ticket price	In-Card	
			Kilometre distance	Ticket price
Delay of 60 – 119 min	272 km	CZK 401	267 km	CZK 401
Delay of 120 min and more	96 km	CZK 201	130 km	CZK 201
2 <sup>nd</sup> class				
Delay of 60 – 119 min	300 km	CZK 401	405 km	CZK 401
Delay of 120 min and more	147 km	CZK 201	199 km	CZK 201

Source: ČD, a. s. *Tariff* [11]

situation of the railway undertaking. The minimum size of the refund should be based on the statistical evaluation of the price of the ticket purchased with the railway undertaking.

On the basis of the questionnaire, more than 76% passengers would get compensation in case of a 120-minute delay; in case of delays in the range of 60 to 119 minutes 62% of passengers could theoretically get compensation. It should be noted, however, that the largest proportion of passengers are commuters travelling at least twice a month. The Directive does not comprehensively solve the situation of season tickets and the solution based on the overall situation on the track is not sufficient for the passengers, because it can happen that a passenger regularly commutes by a train that is delayed and is not entitled to compensation, because other trains on the track run in time and thus determination of the rate of accuracy is not disturbed.

This corresponds to the satisfaction with the current compensation system in Austria, with which only 9% of respondents are satisfied. And as the reason for dissatisfaction, the passengers reported the above mentioned reason in particular.

The situation in the international passenger transport is more difficult than in the domestic one. There are a lot of offers to get a cheap ticket for international travelling. Table 10 shows the shortest relations where it is possible to get compensation. Where the compensation is not possible, there is a cross in the column.

Table 10 - Minimum value of the ticket for obtaining a refund

Relation	Ticket	In-Card
Brno – Bratislava (SK)	✓	✗
Brno – Wien (A)	✓	✓
Praha – Kosice (SK)	✓	✓
Praha – Dresden (D)	✓	✓
Praha – Katowice (PL)	✓	✓

Source: ČD, a. s. *Tariff* [11]

It is necessary to say, that there are a lot of other reductions and offers both in domestic and in international transport, which passengers can use for their journey. In this case the compensation of delay is not

possible (e.g. the cheapest offer to travel abroad is €9).

## 7. CONCLUSION

The compensation forms should follow the recommendation mentioned in Section 6. To get a more simplified compensation process it is good to have conductors equipped with handy cash desk able to print vouchers with compensation or for refreshment. If the conductors are not aboard the train, it should be possible to get the voucher at the station cash desk for the marked ticket.

The development of the compensation policy cannot be based only on customer requirements. If the railway company focuses on providing compensation for delays, it must follow its economic balance. However, as the passengers' opinion survey showed, negative impact of delays can be reduced by providing adequate information to passengers. Based on the passengers' opinion survey, it is necessary to consider the Regulation 1371/2007/ES as the minimum of the possible and on the basis of this reasoning to compile a compensation policy.

Companies involved in the passenger rail transport should adopt such measures so that most delays range up to 10 minutes. The 10-minute limit is a threshold to which most passengers are willing to tolerate a delay, regardless of frequency, distance and reason for the trip.

The costs associated with compensation for the delay should be divided according to the causes of the delay among the individual culprits, so that the railway undertakings bear the responsibility even for delays arising from reasons that are beyond the control of the railway undertaking itself.

The costs associated with compensation can be decreased by the reduction of the range of delay. Each reason of delay has specific requirements for its elimination (better maintenance, safety pre-emption actions, and staff training). Therefore it is necessary to find out the most common reason of delay and to take measures in order to eliminate it. The possible ways are shown in [8].

## ACKNOWLEDGEMENT

This work was financially supported by the Ministry of Education, Youth and Sports of the Czech Republic, Project MSM0021627505 "Theory of Transport Systems".

**TATIANA MOLKOVÁ**, Ph.D.

E-mail: tatiana.molkova@upce.cz

**IVO HRUBAN**, Ph.D.

E-mail: ivo.hruban@upce.cz

Univerzita Pardubice, Dopravní fakulta Jana Pernera,  
Katedra technologie a řízení dopravy  
Studentská 95, 532 10 Pardubice, Česká republika

## ABSTRAKT

Příspěvek se zabývá jedním z důležitých parametrů kvality železniční dopravy – přesností jízdního řádu a zkoumáním požadavků a nároků zákazníků na poskytované služby při zpoždění vlaku v osobní železniční dopravě. Východiskem jsou zjištěné výsledky průzkumu, který proběhl v České republice (Brno hlavní nádraží) a v Rakousku (Wien Westbahnhof). Správné sestavení kompenzační politiky musí zohlednit požadavky zákazníka, ale současně musí reflektovat i ekonomickou bilanci železničního dopravce. Jak však ukázal průzkum mínění cestujících, negativní dopad zpoždění na kvalitu lze snížit i poskytováním vhodných informací cestujícím. Na základě provedeného průzkumu mínění cestujících je třeba nařízení 1371/2007/ES brát jako minimum možného, a na základě této úvahy sestavit kompenzační politiku. Náklady spojené s kompenzací zpoždění je třeba rozdělit podle příčin zpoždění mezi jednotlivé subjekty tak, aby dopravci nenesli odpovědnost i za zpoždění vznikající z důvodů, které samotný dopravce není schopen ovlivnit.

## KLÍČOVÁ SLOVA

kvalita, železniční doprava, zpoždění, kompenzace, modelování

## REFERENCES

- [1] Project MSM0021627505 *Theory of Transport Systems*, University of Pardubice, 2005-2011
- [2] **Mojžíš, V.** et al.: *Kvalita dopravních a přepravních procesů*. 1<sup>st</sup> Edition, Pardubice, Univerzita Pardubice, 2003, p. 174, ISBN 80-86530-09-04
- [3] European standard: *Transportation - Logistics and services - Public passenger transport - Service quality definition, targeting and measurement EN 13816*, Brussels, European Committee of standardization, 2002
- [4] European Standard *EN 15140 Public Passenger Transport – Basic Requirements and Recommendations for Systems that Measure Delivered Service Quality*. Brussels, European Committee for Standardization, 2006, p. 10
- [5] **Albors, E.:** *Transports Metropolitans de Barcelona*, In Marketing and service quality in public transport, OECD Paris 1993, 1st Edition, p. 79
- [6] Studie belegt: So sauer sind die Pendler. Heute, 29.3.2010, No. 1393, p. 10.
- [7] *Spoje Českých drah mají 90% spolehlivost, nej přesnější jsou osobní vlaky a spoje SC Pendolino*. The Czech Railways Press Release [online]. Last actualisation 21.2.2011. [cit. 12.1.2013]. Available at <<http://www.ceskedrahy.cz/tiskove-centrum/tiskove-zpravy/-9690>>.
- [8] **Hruban, I.:** *Delay in Traffic and Transport Quality*, dissertation thesis at University Pardubice, Jan Perner Transport Faculty, Department of Transport Technology and Control, supervisor: Tatiana Molková, 2011, p. 90
- [9] *Regulation of the European Parliament and of the Council No. 1371/2007 on rail passengers' rights and obligations*, Strasbourg: European Parliament and Council, 2007, p. 10
- [10] *Transportation and Tariff, Regulation of 177/51/35 - 36/2010 Acquisition discounts, pilot project compensation in the national railway transport*, Prague, August 2010
- [11] *ČD TR 10 Tariff of Czech Railways for domestic transportation of passengers and baggage*, Prague, 2012, p. 52
- [12] *Österreichischer Eisenbahn- Personen- und Reisegepäcktarif*, Austria, ÖBB [online] last update on March 8, 2011 [cit. April 10, 2011]. Available at <<http://www.oebb.at/static/tarife/oept/index.html>>
- [13] *Information from Slovenian Railways – delay compensation – Pravice Potnikov*, Slovenian Railways, 2010