Determining the dependence of supplementary charges in the ZSSK CARGO tariff in the context of the customer approach, competitiveness and globalization

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Contents

➢ The article deals with the study of the dependencies of selected supplementary charges in rail freight transport.

➢ The article is part of a case study that deals with the development of pricing.

➢ The aim of the research is to point out of the disproportionate increase in the prices of supplementary charge, which form a significant part of the calculation of the price for transportation.

The aim of the article

- Use a simple regression analysis to find the relationship between the amount of the selected surcharge and the external environment factor.

- Verification of the dependency hypothesis and determination of the factor influencing the amount of these fees.

Regression models

- We will examine the deeper nature of the creation of additional charges in relation to the competitiveness of rail transport in relation to other modes of transport.

- As it is not clear to what extent the indicators of the studied phenomena will be dependent, we will use a regression model with free dependence.

Regression models - Label of variables

Variable	The phenomenon under investigation
x	Number of accidents at work
y	Supplementery charges

Regression models - Calculation

$$v_i = n_i + \varepsilon_i$$

- n_i – regression line,
- ε_i – random error of the i-th observation.

Values on the vertical axis

- Accidents at work in railway transport

Values on the horizontal axis

▶ Development of the price for writing the exploratory minutes at the customer´s request

Year	Price for writing the exploratory minutes at the customer´s request
2004	6,83€
2005	7,16€
2006	7,50€
2007	8,07€
2008	8,37€
2009	10,84€
2010	10,84€
2011	10,84€
2012	10,84€
2013	11,30€
2014	20,-€
2015	20,-€
2016	20,40€
2017	20,80€
2018	21,20€
2019	21,85€
2020	22,30€

F-test

- We use the F-test to determine the dependence between the observed phenomena
- We use the following relation for the calculation:

$$(R^2/k)/((1-R^2)/(n-k+1))$$

k – coefficient which takes the value 1 when using a linear dependence and 2 takes the value 2 when using a polynomial dependence

n – number of years in the reference period
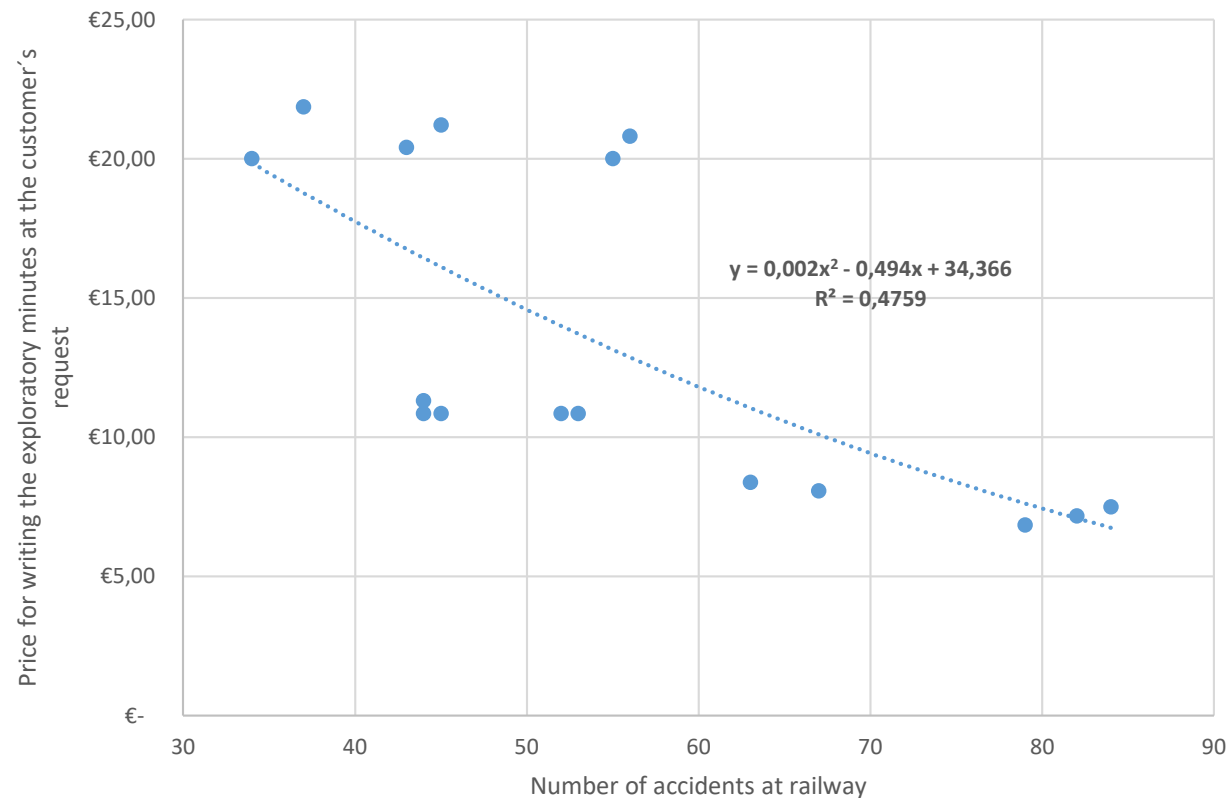
R^2 – reliability equation

Testing statistical hypotheses

- Determination of statistical hyoptheses

H_0	**Price for writing the exploratory minutes at the customer´s request is depends on the number of accidents at work on the railway**
H_1	Price for writing the exploratory minutes at the customer´s request is not depends on the number of accidents at work on the railway

Testing statistical hypotheses

- The polynomial relationship between the price for writing the exploratory minutes at the customer´s request abd the number of accidents at work on the railway

Chart axis labels:
- Y-axis: Price for writing the exploratory minutes at the customer´s request (€25,00, €20,00, €15,00, €10,00, €5,00, €-)
- X-axis: Number of accidents at railway (30, 40, 50, 60, 70, 80, 90)

$y = 0{,}002x^2 - 0{,}494x + 34{,}366$
$R^2 = 0{,}4759$

Testing statistical hypotheses

- Dependency verification

R^2	0,48
k	2
n	16
n-(k+1)	13
F	5,90
F_{TAB}	3,81

Conclusion

- It follows from the Dependency verification that there is a relationship between the price for writing the survey report at the customer's request and the number of third-party injuries on the railway.

- We accept hypothesis H0 and reject hypothesis H1.

- When writing the investigation report, after the depreciation of the wagon consignment, injuries to the injuring party and the injured party may occur if it is damaged.

- Demonstrable dependence proves that, despite safety measures, there are cases where not only the vehicle body is damaged, but also the health and life of the person associated with this activity.

Thank you for your attention