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STUDY OF THE ELASTICITY OF CUSTOMER DEMAND FOR THE PRICE OF THE USE OF FREIGHT WAGONS

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ABSTRACT

Pricing for the service of using freight cars using data from past periods reduces the income of JSC «Ukrzaliznytsia». The transition to the market price of the service will allow the company to increase demand and income from the use of freight cars.

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Introduction.

Providing a freight car for use is a component of the general service of cargo transportation by rail transport. Since 2018, this service has been provided on a competitive basis. It is provided by more than 600 market operators. JSC «Ukrzaliznytsia» is the largest participant in this market. The company owns more than 50% of all freight cars provided to customers for use. However, the share of freight cars of JSC «Ukrzaliznytsia» ordered by clients does not exceed 30%. One of the reasons for this situation is imperfect pricing for the service of using a freight car. The price of the service is formed based on the data of past periods. This causes the price offered by the company to lag behind the market price by a month or more. Such an approach to pricing reduces the company's competitiveness and the demand for its freight cars. The company loses income from this type of service [1].

Research purpose.

Development of tools for measuring customer reaction to the price of a service. Determining the individual price sensitivity of customers ordering rail freight cars for use in conditions close to real time.

Research materials and methods.

Analysis of known methods of measuring the individual elasticity of customer demand. Segmentation of customers by order volumes for the use of freight cars. Customer survey. Systematization of received information.

Results.

More than 10,000 companies use rail freight transportation services. For cargo transportation, they order from one to several tens of thousands of wagons [2]. Depending on the type of cargo transported by rail, JSC «Ukrzaliznytsia» currently allocates 16 types of freight cars. The price for the use of each type of freight car is formed by the company separately. Such a price does not take into account the volume of the order of the service by an individual client and does not correspond to the market price.

In order to correct this situation, in work [3] it was suggested that the company clarify the services calculated according to the current procedures for the use of the freight car before it is delivered to the client. In addition, we offer to segment customers by the scope of services. This allows an individual approach to pricing using pricing approaches proposed by F. Ramsey [4].

However, the implementation of this idea requires determining the individual price elasticity of customer demand. For this purpose, in work [2] it was proposed to conduct a marketing study of the sensitivity of customers to the price. Well-known methods of determining the individual elasticity of demand Gabor-Granger [5] and Van Westendorp [6] were analyzed.

The analysis showed that the Van Westendorp method is usually used for goods and services that are marketed at a free price. In the case of the service of using a freight car, it is already provided. Deviation from the pre-calculated price should not be unprofitable for the company. Therefore, it is worth using the Gabor-Granger survey method to conduct research. The criteria by which the comparison was made are given in Table 1.

Table 1. Comparison of Gabor-Granger and Van Westendorp survey methods.

No	The criterion that was compared	Use in survey method	
		Gabor-Granger	Van Westendorp
1	Survey of customers already receiving the service	+	-
2	Online survey	+	+
3	Automated processing of survey results	+	+
4	Fixed service price offer	+	-
5	The end result may be lower than the cost of the service	-	+
6	It is possible to limit the price offers during the survey	+	-

Source: author's own research.

For the study, a questionnaire was developed with a series of questions about the price of the service, which the client agrees to pay.

The questionnaire contained four levels of price offers. The client was asked whether he agreed to purchase the service at the announced price. In case of an affirmative answer, he was offered the next price, which was 5% higher than the previous offer. Accordingly, if the answer was negative, the price was offered 5% lower than the previous one.

The last positive answer of the client received at the fourth level was taken into account.

Individualization of price offers is achieved by selection of separate groups of customers. For the segmentation of customers ordering freight cars, their distribution was carried out according to the volumes of the service order.

The order step of 60 units is chosen based on the average length of a railway freight train. The distribution results are shown in Table 2.

Table 2. Distribution of customers by volumes of orders for freight cars for use.

Car type	Ranges of the number of wagons ordered in 2021										
	1-60	61-120	121-180	181-240	241-300	301-360	361-420	421-480	481-540	541-600	>601
	Number of customers										
Rolling stock wagons	26	6	9	6	3	1	0	1	0	2	9
Semi-wagons	4520	293	98	72	46	42	40	19	15	14	167
Dump trucks and hopper dispensers	412	123	60	27	6	4	2	3	1	1	10
Cement trucks	198	45	13	7	7	5	2	0	8	3	28
Mineral carriers	29	1	0	2	0	1	1	0	0	0	0
Grain carriers	466	107	52	28	24	18	9	5	8	7	38
The platforms are universal and converted	1379	4	1	1	1	0	0	1	0	0	12
Fitting platforms (large capacity)	148	6	13	2	2	5	4	3	2	2	9
Logging platforms	143	0	0	0	0	0	0	0	0	0	0
Tanks	817	34	27	13	5	2	4	4	1	3	18
Covered wagons	1171	51	26	13	3	2	1	1	0	0	0
Thermos car	1	0	0	0	0	0	0	0	0	0	0
The covered wagons have been converted from refrigerators	33	13	3	0	0	0	0	0	0	0	0
Transporters	46	0	0	0	0	0	0	0	0	0	0
Refrigerators and service and technical wagons	82	8	0	0	0	0	0	0	0	0	0
Fitting platforms (other)	169	33	11	11	6	11	9	7	3	5	23

Source: analytical report of JSC «Ukrzaliznytsia».

Companies using grain wagons for their needs were selected for further surveying. Based on the data presented in Table 2, customers who order grain wagons are segmented into 5 groups (1-60; 61-120; 121-180; 181-300; 300 and more). The survey was conducted in September 2022. A total of 135 companies were interviewed. The obtained data are averaged. Next, they were compared with the real price of the service that JSC «Ukrzaliznytsia» offered to clients (it was UAH 2,417/day). The results of the survey are shown in Table 3.

Table 3. Results of the customer survey.

No	Position	Volume of the annual order of wagons				
		1 - 60	61 - 120	121-180	181 – 300	> 300
1	2	3	4	5	6	7
1	The number of surveyed companies	34	33	23	18	27
2	The average price of the service agreed to be paid UAH/day	2657	2580	2617	2625	2676

Table 3. Continuation.

1	2	3	4	5	6	7
3	Absolute price difference, UAH	240	163	200	208	259
4	Relative price difference, %	10%	7%	8%	9%	11%

Source: author's own research.

The study showed the following.

1. In conditions that are as close as possible to real time, the price of the service of using a freight car differs significantly from the price formed based on the data of past periods.
2. Customers of different individual groups have different price elasticity of demand, which affects the demand for the service if the price is the same for all.
3. Large companies that order more than 300 wagons of grain carriers per year are willing to pay the highest price (+11% to the base price). The smallest - the company, the order volume of wagons of grain carriers is from 60 to 120 wagons per year (+7% to the base price).
4. Customer segmentation and individual price offer may be different depending on the type of freight car offered to the customer.

Conclusions.

JSC «Ukrzaliznytsia» will not be able to compete with companies offering the market price of a similar service when applying pricing based on data from past periods.

The choice of the method of researching the price sensitivity of customers should take into account the peculiarities of the railway company's work.

In order to increase the company's income, it is not enough to divide the price of the service for the use of freight cars by types of freight cars. For this purpose, it is necessary to additionally segment customers according to the volumes of service orders. Segmentation may be different for different types of freight cars.

The price elasticity of demand is different for each group of customers. This makes it possible to apply the principles of pricing proposed by F. Ramsey when setting the price for the service of using freight cars.

REFERENCES

1. Bakalinsky O.V., Malitskyi V.V. Analysis of the action of market factors that cause the latest trends in the market for the use of freight cars. Scientific journal «Roads and road construction» Issue 112 (2022). page 401. DOI: 10.33744/0365-8171-2022-112-401-414.
2. Bakalinsky O.V., Malitskyi V.V. Measuring the sensitivity of customers to the price of the service for the use of freight cars. Bulletin of the National Transport University. Series «Economic Sciences». Scientific journal. Issue 2 (56), 2023 p. 27 DOI: 10.33744/2308-6645-2023-2-56-027-039.
3. Bakalinsky O.V., Malitskyi V.V. Improvement of pricing when setting the price for services for the use of freight cars of JSC «Ukrzaliznytsia». Scientific and practical journal Railway transport of Ukraine No. 2 (143), 2022, p. 52. DOI: 10.34029/2311-4061-2022-143-2-52-58.
4. Ramsey F.P. A Contribution to the Theory of Taxation, Economic Journal (volume 37, number 145, 1927). - C. 47-61.
5. A. Gabor and C. W. J. Granger, «The Attitude of the Consumer to Prices,» In: B. Taylor and G. Wills, Eds., Pricing Strategy, Staples Press, London, 1969, pp. 132-151.
6. Van Westendorp, P (1976) «NSS-Price Sensitivity Meter (PSM) – A new approach to study consumer perception of price» Proceedings of the 29th ESOMAR Congress, Venice, 139–167.