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EFFECT OF MARKET AND USER CHARACTERISTICS ON THE EXPECTED QUALITY OF TAXI SERVICE

ABSTRACT

The taxi system is one of the most famous and developed subsystems of flexible passenger transport. To reach the goal of the system achieving maximum production efficiency, the management focus is directed at users and service quality (SQ). The SQ can have several forms: expected, targeted, delivered, and perceived SQ. We examine the expected SQ, expressed through the users' attitudes about the importance of the defined parameters of the SQ, which represent the users' expectations from the taxi system. The analysis included the data from the conducted studies in three selected taxi systems. The aim of this paper was to determine the effect of market and selected user characteristics on the user expectations, applying the Chi-Square Test. We conclude that the specific market and certain user characteristics affect the user expectations of the taxi system. There is a moderate effect on the employed users, pensioners, and daily users of the taxi system. When it comes to the users who use the taxi system several times a month and week, there is a less significant effect. Other user categories have no significant correlation with the selection of the parameters of the SQ in the taxi system.

KEYWORDS

public transport; taxi system; expected quality.

1. INTRODUCTION

Flexible passenger transport (paratransit) represents a passenger transport subsystem available for all users in time and space as a public or semi-public service, provided by an operator to satisfy different individual transportation needs of consumers [1]. In terms of the basic operational elements, the paratransit system most commonly does not have fixed-line routes and fixed timetables. One of the most famous and developed paratransit subsystems is the taxi transport subsystem. The taxi transport subsystem provides a specific transportation service, which is a public service fulfilling a commonly shared interest. The operator provides the transportation service according to the defined requirement of the consumer (in terms of the journey start time, route, journey length, etc.), which is paid by the consumer based on the pre-defined tariff model. The tariff policy (the basic price level and the model of taxi service price formation) and the operation manner are mainly defined by local authorities based on the specific characteristics of taxi services in the observed transportation market.

In the literature, various terms are used to denote the taxi passenger transport, the most frequent being: Taxi (the UK), Cab – TaxiCab (the USA), Taxis (Australia, Norway). Some of the definitions of taxi transport given in literature are as follows: "... a vehicle with a driver available for hire for the general public" [2] and "... a flexible transport subsystem which provides the users with a whole-day public service in small-capacity vehicles (usually passenger cars or vans) at short distances according to the user demands and the pre-defined and known tariff system" [1].

One of the main characteristics of the taxi transport subsystem is its duality. The taxi system is a system on its own but at the same time, it is a subsystem of a higher system (the public passenger transport system). This duality is perceived in the hierarchically lowest elements of the system, where the effects of the whole system's operation

can be measured. This fact requires a specific manner of organisation and management of the taxi system. To fulfil the set objective that the system has to reach its maximum production efficiency, the management focus is directed at users and the SQ. The expectations of the system users continually change and thus the delivered transportation service should be constantly adjusted to the user demands.

According to the ISO 9000 standard, the SQ is defined as "…the comprehensive characteristics of an entity related to its ability to meet the stated or implied requirements…" [3]. The standards IEC 50-191 (1/191-19-01) define the SQ as: "...the general effect of the service features which defines the level of users' satisfaction..." [4]. These definitions are universal for all services, including the services in public transport. In urban public transport, the SQ is an aspect of influencing travel user choices, defined as customer perception of how well a service meets or exceeds expectations [5]. Therefore, the measurement of the SQ and user satisfaction is an imperative of modern market business and a challenging research theme for both service providers and regulatory agencies [6].

The SQ has several forms: Expected Quality, Targeted Quality, Delivered Quality, and Perceived Quality [7]. The expected (demanded or desired) SQ, which represents user demands, is the basis for planning, designing, and improving the quality of transport service. The targeted SQ shows the level of adjustment between the user demands and operator possibilities. The delivered quality reflects the quality of the system's operation. The perceived quality expresses the level of customer satisfaction with the achieved system results. Defined forms of SQ are successfully applied to public transport system [8].

The available literature in the field of taxi passenger transport shows that up to recently authors have dealt scientifically and professionally with the problems mainly related to the transport service market access [9–12]. In addition to analysing the market access model, Salanova Grau presented a model for determining the optimal vehicle number in the taxi transport system which would ensure reasonable waiting time for users and secure profitability for taxi operators [13]. Wong presented an approach to modelling the taxi service through modelling the transport network with the focus on the demand function and taxi flow density [14]. Butkevicius et al. dealt with the problem of adjusting the demand for taxi services made directly at taxi stands and the offer at these taxi stands [15]. In their paper, Harding et al. analysed the use of modern technologies – taxi applications, as well as the problems taxi operators faced when using applications to connect with the service users [16]. Different cities worldwide have different access to the taxi transport market: limited entry to the transport service market by limiting the number of available licences (New York, Zagreb, Belgrade); no limitations regarding the number of issued licences (Stockholm); extremely high prices of licences (New York); no limitations regarding the number of issued licences while applying strong quality standards (London).

Accordingly, in the last few years, the authors dealing with research in the field of the taxi system have increasingly selected the topic of SQ [17–24]. Wong RCP et al. suggested the methodology for estimating the SQ in the taxi system and analysed the perceived level of SQ in the Hong Kong taxi system [17]. In their article, Alonso et al. presented a research study on modelling taxi perceived quality in which the relevant variables were individualised using focus groups of taxi users, and a satisfaction survey was designed [18]. Shah et al. focused mainly on customer satisfaction with SQ offered by cab drivers in Gladwin Cabs Private Limited, India [19]. Luke et al. presented the findings of a survey that examined the gap between the expectations and the perceptions of minibus taxi users in the Johannesburg area, using a modified SERVQUAL instrument to measure the quality of minibus taxi industry transport services [20]. Mensah et al. examined the effect of perceptual SQ on customer satisfaction by analysing customer perception of SQ provided by taxi drivers in Accra [21]. The factor of customer satisfaction in the Moscow taxi market was analysed in the work of Tverdokhlebova et al. [22]. Hussein dealt with determining which SQ practices were adopted by taxi firms and also established the relationship between SQ and customer satisfaction in the taxi companies in Nairobi [23]. Sitinjak et al. analysed the minimum service standard aspect (the performance of Online-taxi) and defined the model of online-taxi SQ performance and passenger satisfaction relationship [24].

With the emergence of competition in the market of taxi services in the form of companies named differently throughout the literature: TNC (transportation network companies), private-hire driver companies (VTCs), ride-hail services, ride-sharing services, ridesourcing, SQ becomes more important and represents a tool for taxi system sustainability on the market and for retaining existing users. Brown compared the SQ in the taxi system and ride-hail services – Uber, Lyft in Los Angeles [25]. Based on research conducted in Pakistan, Ziyad et al. analysed the effect of the five-dimension quality of the service of the SERVQUAL model, i.e., assurance, responsiveness, empathy, tangibility, and reliability on consumer satisfaction of ride-sharing services [26]. Using a survey of taxi and VTC passengers in Spain, Molina et al. explored connections between loyalty and passenger profiles, experience, and values [27]. Nguyen-Phuoc et al. investigated differences between ride-hailing and traditional taxi services and factors influencing customer loyalty towards ride-hailing taxi services – based on the research conducted in Vietnam [28, 29].

In contrast to the perceived SQ, the expected quality in the taxi system has been insufficiently studied and analysed in the available literature. Studying the expected quality is significant since this form of quality represents the level of SQ that is explicitly or implicitly demanded by the users of taxi system as a part of the public transport system [30]. It is the basis for planning, designing, and improving the transportation SQ. The expected quality is different from the perceived quality because it does not represent the daily experiences of users, but rather what they desire, hope for, or expect from their public transport system [31]. This is why it is important to study the expected quality, the knowledge of which gives local authorities the background information for personalised marketing policies based on the user requirements rather than their daily perceptions [31]. This quality level can be expressed by a set of several quality parameters which represent certain features of SQ.

The authors' idea to make the expected SQ the subject of this paper was not only based on the fact that it has been insufficiently analysed in the available literature. It was also prompted by the fact that the authors had participated in studies conducted in actual taxi systems in several cities (three systems were selected to be included in the paper). This resulted in a high-quality basis (database) for analysing the expectations of the taxi system users and their attitudes towards the defined parameters of SQ.

In this paper, the expected SQ in taxi systems was observed by defining the most important features and parameters of the SQ, determining their importance. Therefore, we used comparative analysis of the effect of market and selected user characteristics on the importance of the defined parameters of the taxi SQ in the three different cities. The aim of the paper is to determine whether there is an effect of market characteristics and an effect of the most significant user characteristics (user profession and frequency of using the system) on the importance of the selected parameters, i.e., on the user expectations.

The paper is organised as follows. Section 2 describes the methodology, defining the most important features and parameters of the SQ, based on literature review presented in the Introduction. Through the comparative analysis of the effect of market and selected user characteristics on the importance of the defined parameters of the taxi SQ in three different cities, Section 3 provides the results and discussion of the results. We finish with some concluding remarks and possibilities of future research.

2. METHODOLOGY

The subject of research in this paper is the expected SQ, i.e., user expectations from the taxi system. The research and analyses are based on the user attitudes about the importance of the defined parameters of SQ in the selected taxi systems. The analyses include research results conducted in the taxi systems in the cities of Kikinda and Užice (Serbia) and Kotor (Montenegro).

We define the following research assumption:

- There is an effect of market characteristics in which the taxi system operates on the users expectations.
- There is an effect of the user characteristics on the user expectations.

To analyse the expected SQ in the taxi systems, we start with defining the most important features and parameters of the SQ. Each feature, depending on the requirements, is used for planning, designing, or estimating the SQ and can be described through a certain number of parameters. They can have absolute, relative, dimensionless,

or probability forms, and they can be statistical, expert, or theoretical according to the manner of determination. Based on the analysis of different approaches to the studying of the SQ in the public transport system, it can be concluded that there is no "ultimate" quality characteristics important for all users, but that their expectations depend on different factors and that lists of importance differ from system to system [32].

Features and indicators of the SQ in taxi systems (*Table 1*) used in this paper were defined based on the recommendations given in standards (IEC 1991), analysis of professional literature, and the authors' research. Features and parameters of the SQ were defined having in mind the aims of the complete system and suitability for practical use. They generally reflect the quality of optimising the key processes, sub-processes, and activities of the taxi system operation.

In all studies which were data sources, the method of data collection was an interview – a survey of taxi system users. Users stated the most important features in the taxi system in their city or expressed their expectations, and their answers were filled in the specially designed questionnaire.

The users of the taxi system in Užice were surveyed by previously trained researchers at selected locations, while in Kikinda and Kotor the users filled in the questionnaires independently in the vehicles during the journey, and they returned them to the driver at the end of the journey. The survey locations in Užice were taxi stands and locations which represent centres of travel attraction/production.

The methodological procedure envisaged the user structure according to different characteristics: gender, age, profession, monthly income, frequency, and purpose of using the service. These characteristics can also be used for confirming the representativeness of the sample and they are extremely significant for understanding the users, i.e., for a detailed analysis of their attitudes and expectations.

In addition to studying the user attitudes towards the service provided by the taxi system, which will be the focus of this paper, other research were also conducted: studying the characteristics of transport demands in the system (analysing the time series of registered calls from databases and call records in the call centres of the existing operators); observing the characteristics of the taxi system operation; studying the characteristics of the operators in the system; investigating the expert attitudes and opinions, and examining the spatial locations, operation, and capacity of taxi stands. To distribute the research material in taxi vehicles in all three systems, the sample was stratified according to the operators, considering the number of vehicles of individual operators to the total number of vehicles in the system.

The third chapter, Results and discussion, contains the analysis of the importance of the defined features of the SQ which have an effect on the users' selection of the taxi system for realising the transport demands (which represent their expectations). In addition to the individual analysis of the importance of parameters in the three selected taxi systems, the comparative analysis of the systems was also conducted. In addition, the authors carried out an analysis of the effect of market characteristics (the taxi system used by the passenger) and characteristics of passengers (users' profession and frequency of using the taxi system) on the importance of the parameters of the SQ per system. The crosstab analysis was conducted for

Table 1 – Defined features and parameters of the SQ

SQ feature	SQ parameters	Description of the parameters
Organisational support	Price of the service	The price corresponds to the SQ
Organisational support	Journey time	Acceptable total journey time from the start to the end of the journey
Service stability	Reliability	No cancellation of the journey
Service availability	Accessibility of the service	The service is available in time and space
Ease of use	Comfortable journey	An adequate vehicle adapted to the taxi system operation
Ease of use	Flexibility in journey planning	Possibility of planning and optimising the journey according to the existing needs

the mentioned analysis, and the Chi-Square Test was used to check the independence of the variables.

3. RESULTS AND DISCUSSION

3.1 Structure and market characteristics

The taxi systems selected for the analysis of the expected SQ in this paper are the systems in two cities in Serbia: Kikinda and Užice, and the city of Kotor in Montenegro. Each of the selected taxi systems has its specific characteristics but they also have similarities based on which they were selected as suitable for the comparative analysis. All selected taxi systems lack a unique system for monitoring and control of service provision at the level of the complete system. Operators have their ride-booking systems and some of them have systems for monitoring and control of the operation at the level of their organisation. However, none of the selected cities has a unique system for ride-booking, monitoring, and control of the operation, and consequently a unique database. This underlines another similarity between the selected taxi systems – there is no adjustment between transport capacities and the actual needs of the system users. In addition to the mentioned similarities, each city has its specific characteristics which make them an attractive transport service market. Kotor represents a tourist attraction, Užice has a specific terrain configuration which leads to a more intensive taxi service use since it is impossible to organise mass public transport in part of the market, while Kikinda has a low level of service of the bus public transport.

Table 2 provides the basic markets and taxi systems characteristics of the three selected cities in the periods when the studies were conducted.

Based on the obtained sample – the number of surveyed users in the three selected systems (Kotor – 291, Kotor – 273, Užice – 362 taxi system users) and the cities populations shown in the previous table, it can be concluded that the sample is representative. This is particularly the case if the sample is compared with the sample size and population in other cities analysed in the literature (Moscow 292 users [22]/11,920,000 inhabitants; Los Angeles 1,680 users [25]/3,792,621 inhabitants; Hong Kong 1,008 users [17]/ 7,500,700 inhabitants).

Tables 3 and 4 show the structure of users according to the two significant characteristics: profession and frequency of using the system. Profession defines economic preferences of the users while frequency is used to understand mobility patterns of the users.

Table 5 shows user expectations according to the categories and analysed taxi systems.

Table 3 – User structure according to the profession

City	Kotor (%)	Kikinda (%)	Užice (%)
Employed	55.20	47.58	45.03
School student	6.81	11.52	20.44
University student	16.13	7.43	6.91
Pensioner	10.39	17.84	18.51
Unemployed	8.96	13.01	7.46
Other	2.51	2.60	1.66
Total	291	273	362

Table 4 – User structure according to the frequency of using the service

City	Kotor (%)	Kikinda (%)	Užice (%)
Every day	42.46	18.01	14.09
Several times a week	34.39	36.76	35.08
Several times a month	14.39	31.25	35.91
Very rarely	8.77	13.97	14.92
Total	291	273	362

Table 2 – The basic markets and taxi systems characteristics

Indicator/City	Kotor (2016)	Kikinda (2017)	Užice (2019)
Population (2011) – City/Agglomeration	12,583 /22,601	35,065 /59,453	59,747 /78,040
Area	335 km^2	783 km^2	667 km^2
Total number of taxi vehicles	123	135	286
Average daily number of rides [rides/vehicle]	14.3	18.9	25.0
Average ride time [min]	7.991	7.992	6.530
Average ride length [km]	4.00	2.53	2.54

Table 5 – Crosstab table of the parameters of the SQ according to user characteristics and according to systems

Characteristics	City	Price of the service	Journey time	Reliability	Accessibility of the service	Comfortable journey	Flexibility in journey planning	Other	Total
Profession									
Employed	Kikinda	69	52	46	46	65	27	16	321
	Kotor	43	75	63	66	60	19	0	326
	Užice	86	52	49	88	57	51	79	462
	Total	198	179	158	200	182	97	95	1109
School student	Kikinda	20	11	19	6	15	7	5	83
	Kotor	4	4	10	9	7	3	0	37
	Užice	41	29	30	40	39	18	15	212
	Total	65	44	59	55	61	28	20	332
University student	Kikinda	11	13	9	6	7	1	5	52
	Kotor	10	18	16	19	16	10	1	90
	Užice	18	10	7	14	9	9	6	73
	Total	39	41	32	39	32	20	12	215
Pensioner	Kikinda	21	20	23	19	27	10	5	125
	Kotor	10	12	16	12	6	5	0	61
	Užice	33	19	19	35	39	19	28	192
	Total	64	51	58	66	72	34	33	378
Unemployed	Kikinda	17	19	20	12	20	5	5	98
	Kotor	6	12	10	12	9	2	1	52
	Užice	17	10	8	13	13	9	9	79
	Total	40	41	38	37	42	16	15	229
Frequency of using the service									
Every day	Kikinda	27	23	26	10	20	6	2	114
	Kotor	29	58	44	47	42	16	0	236
	Užice	27	17	15	33	16	22	17	147
	Total	83	98	85	90	78	44	19	497
Several times a week	Kikinda	53	47	38	35	52	18	16	259
	Kotor	25	40	42	40	35	13	0	195
	Užice	67	42	35	60	55	43	49	351
	Total	145	129	115	135	142	74	65	805
Several times a month	Kikinda	40	33	35	29	45	19	11	212
	Kotor	10	15	17	17	17	6	2	84
	Užice	71	38	43	62	68	31	56	369
	Total	121	86	95	108	130	56	69	665
Very rarely	Kikinda	18	12	18	15	17	7	7	94
	Kotor	9	8	12	14	4	4	0	51
	Užice	30	23	20	35	18	10	15	151
	Total	57	43	50	64	39	21	22	296
Total									
All users	Kikinda	138	115	117	89	134	50	36	679
	Kotor	73	121	115	118	98	39	2	566
	Užice	195	120	113	190	157	106	137	1018
	Total	406	356	345	397	389	195	175	2263

3.2 Importance of quality parameters

The Methodology chapter offers the definition of parameters of the SQ, whose importance is presented in *Figure 1* for the three analysed systems. The users were offered to select the three most important parameters of the SQ from the provided responses in the questionnaire. The most frequently selected parameters have the highest importance.

The largest number of taxi system users in Kikinda selected *Journey time* and *Comfortable journey* as the most important parameters of the SQ (19.89%). Moreover, a significant number of users in Kikinda defined *Reliability* and *Price of the service* as important parameters of the SQ of the system they used (approximately 17%). According to the results of the study conducted in Kotor, the most important parameters of the SQ are Price of the service (21.06%), *Reliability of the system* (20.90%), and *Accessibility of the system* (20.58%). The share of the mentioned parameters in the total number of responses indicates that all three parameters are equally important. *Journey time* (18.91%) and *Accessibility*, i.e., availability of the service in time and space (18.82%) have the greatest impact on the selection of the taxi system for journey realisation for users in Užice. The third-placed parameter is *Comfort* provided by the taxi system, with a share of 15.32%.

The effect of specific characteristics of certain markets is reflected in the different importance ranking of particular parameters for users who choose one of the three selected taxi systems for realising their transportation needs. Thus, *Journey time* is one of the most important parameters of the SQ in the cities of Kikinda and Užice, while in Kotor it is only the fifth according to its importance. This difference between the user attitudes in Kotor and the other two systems is expected taking into account the complex traffic situation and limited infrastructure capacity in Kotor, where during the peak hour taxi vehicles share the same destiny with other vehicles, particularly at the city entry and exit roads, without the possibility of using some of the priority measures (yellow road lines and alike). *Accessibility* or the availability of the service in time and space is the other parameter affected by the mentioned characteristics of the market in Kotor as well as the terrain configuration in Užice (which leads to the inaccessibility of the mass public transport, particularly in winter months). Although this parameter is the second most important in the taxi system in Užice and the third most important in Kotor, deviations in comparison to higher-ranked features are minimal (Užice 0.09%; Kotor 0.42%). In other words, it can be said that this feature's importance for the users of these two taxi systems is greater than shown by the importance ranking order. On the other hand, *Accessibility of the service* was ranked as low as the fifth important parameter of the SQ by the users of the taxi system in Kikinda. In addition to *Reliability*, the *Price of the service* was the most important parameter of the SQ for the users of the Kotor taxi system, which is atypical for taxi systems. During the research on the taxi system in Kotor, the *Price of the service* was very accessible and competitive in comparison to the price of a single-ride ticket in the public transport system in Kotor. This resulted in the atypically high ranking of this parameter of SQ

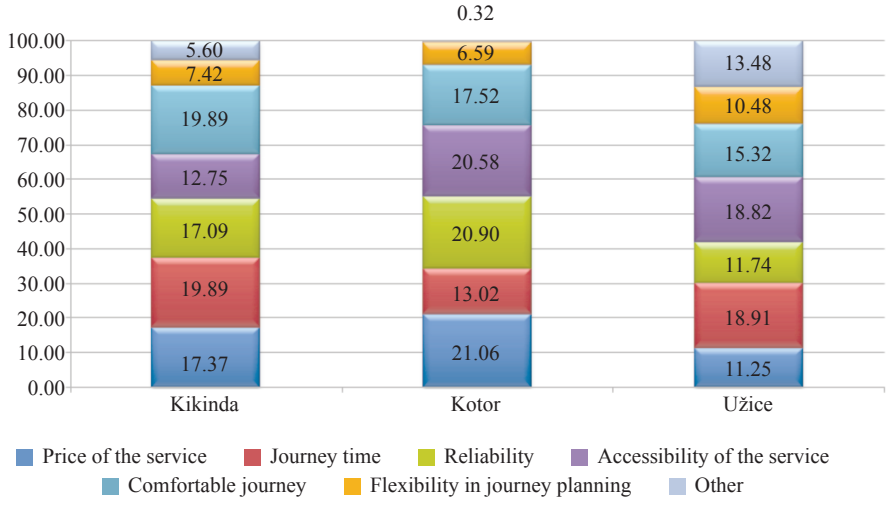

Figure 1- Expected SQ in the three taxi systems

in taxi systems. *The price of the service* was ranked third by the taxi system users in Kikinda, while it was ranked fifth in Užice.

User attitude towards the possibility of direct participation in the journey planning and optimisation, expressed by the parameter *Flexibility in journey planning*, is rather interesting. If the category *Other* is disregarded, this parameter of the SQ was ranked last in Kotor (6.59%) and second to the last in Kikinda (7.42%) and Užice (10.48%). Such distribution might stem from the lack of the respondents' perception of the advantages provided by direct journey planning or their opinion that this is something implicit. Therefore, their expectations are directed towards other parameters they require to be of high quality when it comes to the provided transport service in the taxi system.

3.3 Effect of market and user characteristics

The Chi-Square Test was applied for analysing the effect of market and passenger characteristics on the importance of the parameters of SQ. Non-parametric tests are suitable for the selected characteristics since they represent categorical variables. The starting hypothesis of the Chi-Square Test of independence in all tests hereinafter is that the observed variables are independent.

First, we tested the existence of the effect of market characteristics on the importance of the parameters of the SQ (*Table 6*). Based on the Pearson Chi-Square value, which was not lower than the threshold value by 12 degrees of freedom (21.026) and Sig. value which was lower than 0.05, it was determined that there was a correlation between market characteristics and the importance of the parameters of the SQ. Since the correlation between the analysed variables was confirmed, the starting Chi-Square Test hypothesis was rejected.

Since the effect was confirmed, the next step was to analyse the effect size. According to the Phi coefficient value (0.272), which was greater than 0.10 and lower than 0.30, it was concluded that the correlation between the market characteristics and importance of the parameters of the SQ was not significant, i.e., that the effect size is small (the value above 0.30 represents the medium importance).

The second step involved testing the existence of the effect of user characteristics on the importance of the parameters of SQ (*Tables 7 and 8*). In this analysis,

Table 6 – Chi-Square Tests - Effect of market characteristics on the importance of the parameters of SQ

	Value	df	Asymp. Sig. 2-sided		Value
Pearson Chi-Square	167.435[a]	12	0.000	Phi	0.272
Likelihood Ratio	192.751	12	0.000	Cramer's V	0.192
N of Valid Cases	2,263			*N* of Valid Cases	2,263

[a] 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 43.77

Table 7 – Chi-Square Tests – Effect of the profession on the importance of the parameters of SQ

	Kikinda			Kotor			Užice		
	Value	df	Asymp. Sig. 2-sided	Value	df	Asymp. Sig. 2-sided	Value	df	Asymp. Sig. 2-Sided
Pearson Chi-Square	19.354[a]	24	0.733	19.011[b]	24	0.751	27.832[c]	24	0.267
Likelihood Ratio	20.232	24	0.684	18.484	24	0.779	28.795	24	0.228
Linear-by-Linear Association	0.003	1	0.953	0.081	1	0.776	0.181	1	0.671
N of Valid Cases	679			566			1,018		

[a] 3 cells (8.6%) have an expected count of less than 5. The minimum expected count is 2.76
[b] 9 cells (25.7%) have an expected count of less than 5. The minimum expected count is 0.13
[c] 0 cells (.0%) have an expected count of less than 5. The minimum expected count is 7.60

Table 8 – Chi-Square Tests – Effect of the frequency of using the service on the importance of the parameters of SQ

	Kikinda			Kotor			Užice		
	Value	df	Asymp. Sig. 2-sided	Value	df	Asymp. Sig. 2-sided	Value	df	Asymp. Sig. 2-sided
Pearson Chi-Square	14.703[a]	18	0.682	20.104[b]	18	0.327	23.065[c]	18	0.188
Likelihood Ratio	15.647	18	0.617	16.782	18	0.538	23.124	18	0.186
Linear-by-Linear Association	5.097	1	0.024	0.090	1	0.764	1.835	1	0.176
N of Valid Cases	679			566			1,018		

[a] *1 cell (3.6%) has an expected count of less than 5. The minimum expected count is 4.98*
[b] *5 cells (17.9%) have an expected count of less than 5. The minimum expected count is 0.18*
[c] *0 cells (.0%) have an expected count of less than 5. The minimum expected count is 7.60*

the category Other was excluded from the user structure according to the profession since it did not fulfil the criteria.

First, the effect between the users' professions and user expectations from the system was tested. Since for all observed markets the Pearson Chi-Square value was lower than the threshold value by 24 degrees of freedom (36.415) and Sig. value was not lower than 0.05, it was concluded that there was no significant correlation between the users' professions and the importance of the parameters of the SQ.

Testing the existence of the effect between the frequency of using the taxi system and the importance of the parameters of the SQ also provided the results confirming that there was no correlation between these data (the Pearson Chi-Square value was lower than the threshold value by 12 degrees of freedom (28.869) and Sig. value was not lower than 0.05).

Based on the Chi-Square Test results between the two selected characteristics of users and the importance of the defined parameters of the SQ, it can be concluded that the correlation between the analysed variables was not confirmed. In other words, the second starting hypothesis of the Chi-Square Test about the mutual independence of the variables was confirmed.

Considering the previous results, the further analysis involved testing the effect of market characteristics on the importance of the defined parameters of the SQ, according to user characteristics. An additional Chi-Square Test hypothesis was set stating the following: there is no effect of market characteristics on user expectations depending on the user characteristics.

First, we tested the effect of market characteristics on the importance of the parameters of the SQ depending on the users' profession (*Table 9*). The test results showed that the Pearson Chi-Square value was not lower than the threshold value by 12 degrees of freedom (21.026) and that the Sig. value was lower than 0.05 only for the employed and pensioners. Based on the results, it can be concluded that the Chi-Square Test hypothesis is rejected for these two user categories, while it cannot be rejected for the school student, university student, and the unemployed categories. In other words, the expectations of the employed and pensioners depend on the city they live in, while this is not the case for other categories.

After it was determined that there was an effect of market characteristics on the importance of the parameters of the SQ for the employed and pensioners, the effect size was also defined. Based on the values of the Phi coefficient and Cramer's V coefficient concerning the threshold value of the coefficient representing the medium effect (Phi – 0.3 and Cramer's V – 0.21), it can be concluded that the effect size of these two categories is moderate. The university student user category has the following values of coefficients: Phi=0.312 and Cramer's V=0.221 (medium importance), but according to its Sig. value it is not statistically significant.

Testing the effect of market characteristics on the importance of the parameters of the SQ depending on the frequency of using the taxi system provided the following results: the Pearson Chi-Square value was smaller than the threshold value by 12 degrees of freedom (21.026) and Sig. value was not smaller than 0.05 only for consumers who used the taxi system very rarely (*Table 10*).

Table 9 – Chi-Square Tests – Effect of the users' profession on the importance of the parameters of SQ concerning the city where the system operates

		Value	df	Asymp. Sig. 2-sided	Coefficient and Sample	Value
Employed	Pearson Chi-Square	122.986[b]	12	0.000	Phi	0.333
	Likelihood Ratio	143.208	12	0.000	Cramer V	0.235
	N of Valid Cases	1,109			Number of cases	1,109
School student	Pearson Chi-Square	16.115[c]	12	0.186	Phi	0.220
	Likelihood Ratio	19.306	12	0.081	Cramer V	0.156
	N of Valid Cases	332			Number of cases	332
University student	Pearson Chi-Square	20.968[d]	12	0.051	Phi	0.312
	Likelihood Ratio	24.127	12	0.020	Cramer V	0.221
	N of Valid Cases	215			Number of cases	215
Pensioner	Pearson Chi-Square	33.680[e]	12	0.001	Phi	0.298
	Likelihood Ratio	38.724	12	0.000	Cramer V	0.211
	N of Valid Cases	378			Number of cases	378
Unemployed	Pearson Chi-Square	18.124[f]	12	0.112	Phi	0.281
	Likelihood Ratio	18.456	12	0.103	Cramer V	0.199
	N of Valid Cases	229			Number of cases	229
Total	Pearson Chi-Square	167.435[a]	12	0.000	Phi	0.272
	Likelihood Ratio	192.751	12	0.000	Cramer V	0.192
	N of Valid Cases	2,263			Number of cases	2,263

[a] *0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 43.77*
[b] *0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 27.50*
[c] *3 cells (14.3%) have an expected count of less than 5. The minimum expected count is 2.23*
[d] *3 cells (14.3%) have an expected count of less than 5. The minimum expected count is 2.90*
[e] *0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 5.33*
[f] *0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 43.77*

Table 10 – Chi-Square Tests – Effect of the frequency of using the service on the importance of the parameters of SQ concerning the city where the system operates

		Value	df	Asymp. Sig. 2-sided		Value
Every day	Pearson Chi-Square	73.582b	12	0.000	Phi	0.385
	Likelihood Ratio	76.509	12	0.000	Cramer V	0.272
	N of Valid Cases	497			Number of cases	497
Several times a week	Pearson Chi-Square	65.818c	12	0.000	Phi	0.286
	Likelihood Ratio	78.858	12	0.000	Cramer V	0.202
	N of Valid Cases	805			Number of cases	805
Several times a month	Pearson Chi-Square	32.822d	12	0.001	Phi	0.222
	Likelihood Ratio	35.407	12	0.000	Cramer V	0.157
	N of Valid Cases	665			Number of cases	665
Very rarely	Pearson Chi-Square	13.733e	12	0.318	Phi	0.215
	Likelihood Ratio	17.433	12	0.134	Cramer V	0.152
	N of Valid Cases	296			Number of cases	296
Total	Pearson Chi-Square	167.435a	12	0.000	Phi	0.272
	Likelihood Ratio	192.751	12	0.000	Cramer V	0.192
	N of Valid Cases	2,263			Number of cases	2,263

[a] *0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 43.77*
[b] *1 cell (4.8%) has an expected count of less than 5. The minimum expected count is 4.36*
[c] *0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 15.75*
[d] *0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 7.07*
[e] *2 cells (9.5%) have an expected count of less than 5. The minimum expected count is 3.62*

Based on the results, it can be concluded that the Chi-Square Test hypothesis stating that there is no dependence between the variables is confirmed for this user category, while it is rejected for the categories of users who use the taxi system every day, several times a week, and several times a month.

The analysis of the coefficient values leads to the conclusion that the size of the effect of the everyday users is moderate (Phi=0.385, Cramer's V=0.272), while the effect of the city has a lower effect on the expectations of the other two user categories (several times a week: Phi=0.286, Cramer's V=0.202, several times a month: Phi=0.222, Cramer's V=0.157). According to the coefficient values, users who use the system very rarely have the effect size of small significance but have no statistical significance because of the Chi-Square Test value.

The following conclusions can be made based on the analysis the effect of market characteristics on the expectations of users categorised regarding their profession and frequency of using the taxi system:

- There is an effect of market characteristics on the expectations of the employed users and pensioners.
- There is an effect of market characteristics on the expectations of the users who use the taxi system every day, several times a week, and several times a month.

4. CONCLUSION

This paper aimed to determine whether there was an effect of market and user characteristics on the user expectations. The analysis of the taxi service operation in the actual conditions in the selected cities led to the conclusion that the markets in which the analysed taxi systems operated had certain specific characteristics. These specific characteristics have various effects, such as more intensive use of the taxi system than usual (Užice) and noticeable differences between the systems regarding the user expectations reflected in the assigned importance to the parameters of SQ. Based on the analysis of the results of studying the expected SQ in the three selected taxi systems, it can be concluded that some of the typical features of the taxi service are not recognised to a sufficient degree in all analysed systems or are not significant for users because they consider them implicit. On the other hand, some parameters which are not typical for taxi systems have been defined as important in some systems as a consequence of market characteristics. Thus, *Journey time* is the most important parameter in the taxi systems in Kikinda and Užice, while it is ranked as low as fifth in Kotor. *Price of the service* was ranked first in Kotor, which is very atypical for taxi systems, but at the same time it is a consequence of the market characteristics in which the Kotor taxi system operates.

The following results were obtained by testing the independence of the variables – market and user characteristics on the one hand and user expectations on the other hand:

- The first hypothesis regarding the independence of market and user expectations was rejected, i.e., it was confirmed that market characteristics affected the user expectations.
- The second hypothesis regarding the independence of user expectations from the selected user characteristics was confirmed: there was no effect of the users' profession and frequency of using the service on the user expectations.

After the starting hypotheses were tested, an auxiliary hypothesis was established for testing the effect of market characteristics on the importance of the parameters of the SQ depending on the users' profession and frequency of using the taxi system. The application of the Chi-Square Test confirmed that there was a correlation between certain variables and that the size of these effects was different. A medium effect was confirmed for the employed, pensioners, and daily users of the taxi system. It was also confirmed that there was an effect, though less significant, for the users who used the taxi system several times a month and several times a week. Other user categories had no significant correlation with the selection of the parameters of the SQ in taxi systems.

The confirmed effects, the effect of market and user characteristics also indicate that the taxi system, as well as its hierarchically higher system – the public transport system – must be designed in accordance with the actual (specific) transport service market, i.e., they must be tailored to the taxi service users in the city where they operate.

In addition to studying the expected SQ, further research should involve all forms of the SQ, particularly the perceived level of quality of the system and service. This is necessary for reengineering and continuous improvement of taxi systems. In this manner, it would be possible to estimate the degree of fulfilment of taxi system user expectations by

comparing the importance of certain parameters of the SQ and evaluations that the users would assign to each of the analysed parameters.

In order for the system to improve continuously, the research on the SQ should be conducted at specific time intervals. This would enable not only mutual benchmarking of taxi systems following the expectations and level of satisfaction, but also internal benchmarking of each taxi system (monitoring and comparing user expectations and level of satisfaction at different time intervals within the system itself). Quality management represents a continuous process of searching for a better service.

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UTICAJI SPECIFIČNOSTI TRŽIŠTA I KARAKTERISTIKA KORISNIKA NA OČEKIVANI KVALITET USLUGE U TAKSI SISTEMIMA

REZIME

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KLJUČNE REČI

javni transport putnika; taksi sistem; očekivani kvalitet usluge.

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