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Abstract: The aim of the paper focuses on generating insights into the competitiveness of public transport in Moscow City in relation to the use of personal cars, considering individual basic consumer values and environmental factors, including the impact of the COVID-19 pandemic. The research question in this study is: how can we assess the main indicators of public transport's competitiveness, which can motivate personal car owners with specific basic values to change the transportation mode for personal mobility? This conceptual research model combines the content analysis of publications and large-scale online survey of Moscow City's car owners—potential consumers of public transport services—on a representative quota sample of 1263 respondents. The methodology includes the axiological approach for the identification of the main factors of consumer behavior of personal car owners in the city with combinations of the modified Schwartz's methodology of the basic individual values evaluations. Secondary data manifested the changes in the behavior of car owners due to the fact that they value metropolitan environmental degradation and changed their transportation preferences to public transport even during the COVID-19 pandemic. Based on the factor and cluster analysis of the value profile of the individuals, seven clusters of car owners were identified, and two large clusters were selected as target segments for public transport services. The conclusion was made that it is necessary to differentiate social and marketing programs to promote the competitiveness of public transport in the minds of consumers.

Keywords: competitiveness management; public transport; axiological approach; basic consumer values; indicators of competitiveness; management innovations; COVID-19

1. Introduction

In the conditions of implementation of the sustainable development concept, the most important strategic task of social, economic, and ecological nature is to increase the competitiveness of public transport services in order to increase the indicators of mobility and quality of life of the population, to reduce environmental impact on the sustainability of megacities [1–6].

In the present conditions, public transport is losing its attractiveness and competitiveness in comparison with alternative modes of transport because of its current state [4–7]. In the long term, a decrease in demand for public transport services is forecasted due to the growing demand for individual means of transport and mobility [8]. At the same time, private road transport, as the main mode of transport in most major cities of the world, creates social and environmental problems related to road traffic, such as congestion, traffic accidents, an adverse impact on the environment of

megacities [1,9–17]. Accordingly, from an ecological point of view, any incentives that encourage people to choose alternative modes of public transport, rather than personal cars, seem particularly effective.

In this regard, an acute and urgent problem for scientists and decision makers in the field of ensuring the environmental well-being of megacities and managing the competitiveness of public transport is the problem of consumer choice of alternative modes of transport. The problem of consumer choice in the decision-making process is studied in modern scientific literature from the perspective of different branches of science and approaches. In particular, the scientific literature on the topic of competitiveness of goods and services is increasingly beginning to meet an axiological approach to the study of consumer behavior: the study of value orientations, value systems, and the value structure of personality as the most important variables affecting the choice of consumers [18–28]. The review of scientific research conducted by the authors shows the diversity of consumer choice and preference research based on value theories [18,29,30] for different industries, subjects of purchase and sale, and the strata being studied. At the same time, the lack of research into the value orientations of car owners—potential consumers of public transport services—in the process of making decisions on the choice of alternative modes of transport is noted.

Management of competitiveness of public transport services is considered by authors as purposeful influence of state structures and economic subjects of the market of the same name on processes of formation of competitive advantages for creation of the added value of public transport services to potential and actual consumers (the population of metropolis). The basis for managing the competitiveness of public transport services has to include a set of data on the system of consumer values, the peculiarities of the decision-making process on the methods of movement, internal and external factors influencing the choice, and the actual variables of consumer behavior.

In this study, the new approach to ensuring the competitiveness of public transport in Moscow City with regard to the use of private cars was developed, considering individual basic consumer values and environmental factors, including the consequences of the COVID-19 pandemic.

According to this, the research question was formulated: how can we assess the main indicators of public transport's competitiveness, which can motivate personal car owners with specific basic values to change the transportation mode for personal mobility?

In this study, the axiological approach was used to select the main factors: What is the impact on consumer behavior of private car owners? Who is demonstrating the concern of the environmental problems of the city and readiness to make their consumer choice to change the modes of transport for their own mobility?

The novelty of this approach is expressed in the study and assessment of values as life principles and benchmarks that guide individuals in their decision-making process when choosing a mode of transportation in a metropolis and alternative modes of transportation. Potential consumers of public transport services—owners of personal cars—were chosen as the units of the studied set. Studying the values of car owners according to Schwartz's method will allow us, on the one hand, to study the values of strata in connection with changes in the external environment (including impact of COVID-19 pandemic), on the other hand, the values of the individual in connection with its consumer preferences, intentions to make a choice to another transport mode, and their perceptions and motivations [20,23–26,31].

The research methodology includes a set of desk and field methods. Content analysis of secondary data on problems of managing competitiveness of public transport services due to environmental degradation of the metropolises even during COVID-19 pandemic, and variables and a set of individual basic values of behavior of personal car owners as potential consumers of public transport services are used with the help of an axiological approach to study the consumer behavior variables in the first stage. In the second stage, the large-scale online survey of a representative sample of 1263 respondents—personal car owners of different ages and social positions and representing different districts of Moscow City was organized. This survey was done with use of consumer panel of Online

Market Intelligence (OMI) research agency on the basis of the author's methods and methodology of human's value study of Sh. Schwartz [20].

2. Literature Review

2.1. Management of the Competitiveness of Public Transport Services in the Conditions of Environmental Degradation of Metropolises

According to the international base Scopus, the beginning of scientific publications on the problems of competitiveness of public transport dates back to 1987, when the first scientific article on this topic was published. The statistics of the international base Scopus for the period from 1987 to 2020, 349 multidisciplinary studies have been devoted to the issues of public transport competitiveness.

The growth of publications on the theme of managing the competitiveness of public transport services is due to environmental problems of megacities and the impact of the road transport complex on the ecosystem of cities. The researchers analyze the processes of degradation of the city ecosystem, among other factors, which are caused to a greater extent by the use of private cars [1,9–12,16,17,32]. Special attention is paid not only to the problems of destruction of the city ecology, but also to the issues of destruction of human ecology: high automobile dependence leads to a significant reduction in physical activity, increased risk of diseases, reduced human interaction, increased noise level, reduced air transparency, and reduced contact with various and stimulating natural ecosystems significantly reduce the quality of life of the metropolitan population [4,5,13–15,33].

It should be noted that the degree of development of the theory and practice of managing the competitiveness of public transport services in the conditions of environmental degradation of megacities is different in different countries and regions of the world. The dynamics of publishing activity shows that this topic is widely researched by authors from developed economies [8,34–38]. Researchers note that in recent decades there has been a significant increase in the number of car owners; according to forecasts, this trend will continue [8]. In this regard, the question “how to transfer people from personal transport to public transport?”, which, for example, is published in the name of the scientific work of an American scientist, is acute and relevant for scientists from developed countries [37]. In order to answer this question, research is being conducted into the possibilities and ways of increasing the mobility of citizens through a combination of more environmentally friendly modes of transport, including public transport, car sharing, or completely carbon-free modes such as walking and cycling. At the same time, joint mobility can have significant potential to fill the gap between public and private transport, increase the availability of existing public transport services, reduce car ownership, and reduce the burden on the environment [37–40].

Problems of imbalance of supply and demand for transport services due to underdeveloped transport infrastructure are particularly relevant for scientific communities of developing countries [41,42]. The use of non-standard public transport modes, characterized by flexibility in choice of route, time, and mode of service provision, allows overcoming contradictions between growing demand for transport services and their supply [42,43].

Scientific papers on the topic of competitiveness of public transport services not only focus on economic and environmental issues [44–46], but also on the politic, cultural, and social aspects of the management decisions [13,46–49], which correspond to the concept of sustainable development of countries (cities).

2.2. Variable Behavior of Potential and Actual Consumers of Public Transport Services

It should be noted that quite a long period of research on this topic was characterized by the fact that in the theory and practice of managing the competitiveness of public transport services of the metropolis has not yet developed a conceptual understanding of the degree of influence of consumers of these services on the adoption of managerial decisions of state structures and economic entities of

the market to ensure the competitiveness of public transport. As a result, studies of consumer behavior variables: preferences, attitudes, values, motivations, and others up to 2014 were dotted.

Formation of a comprehensive approach to managing the competitiveness of public transport services based on the study of consumer behavior variables and, accordingly, intensive research in this direction can be attributed to the period 2014–2020 [13,16,50].

As a result of the analysis of scientific research carried out by the authors, the following variables of consumer behavior have been identified, the study of which allows us to justify decision making on the creation of key competencies, competitive advantages, and the competitiveness of public transport in comparison with alternative modes of transport and, in particular, with individual road transport (Table 1).

Table 1. Variable behavior of potential and actual consumers of public transport services.

Variables of the Consumer Behavior and Scientific Research of the Selected Variables		
Choice	Attitude	Opinion
Population’s choice of non-standard public transport modes and analysis of factors influencing their choice [51]; consumers’ choice of the way of movement based on the determination of the relationship between behavioral characteristics, attitude, information possession, place of residence [52]; consumer behavior and choice due to the interdependence between socio-demographic characteristics and intensity of transport use [53]; influence of behavior, subjective norms, supposed control opinions on the choice of public transport services [54].	Attitude and evaluation by potential and actual consumers of public transport services of separate/autonomous transport services and service packages [36]; consumer attitude towards suburban bus transportation services [53]; attitude of travelers to transport along with the study of perception of quality of public transport services, segmentation of consumers of public transport services by the criterion of “attitude” [39].	Opinion and evaluation by consumers of quality indicators of public transport services: speed, frequency, purpose [37]; the opinion of tourists and city residents about fairness in the context of urban mobility, primarily in the context of the functioning of urban public transport and shuttle buses [8]; residents’ opinion about competitiveness of prices for urban transport in comparison with the prices of consumption of individual motor vehicles [55].
Perception	Values	Satisfaction and Loyalty
Perception of financial incentives by consumers of passenger cars/car owners to demonstrate environmental behavior [56]; the public’s perception of the degree of development, accessibility, efficiency of public transport services and the convenience of driving a private car, and the degree of public approval of measures aimed at improving the sustainability of transport [35]; passengers’ perception of the quality of transport services and importance of certain criteria in their perception [57]; passengers’ perception of the quality of the process of transport service provision, assessment of their attitude to the quality of service according to certain parameters of comfort, safety, and awareness [58].	Environmental values and respect for the nature of consumers with different levels of education [59]; values and evaluation of values oriented towards environmental and sustainable development in connection with types of motivation: friendliness, universalism, self-sufficiency when demonstrating a hybrid car connected to the electricity grid [20]; personal values of the vehicle consumer and attributes of the car, the relationship, and interpretation of cognitive relationships between them from three theoretical points of view, providing multidimensional profiles to explain consumer values [21].	Satisfaction: passenger satisfaction with the public transport system [17]; passenger satisfaction with the quality of Moscow Metro transport service in terms of convenience of movement, mobility, security, quality of transport, and information infrastructure [60]; passenger loyalty based on the study and analysis of the relationship of variables: quality of service, passenger satisfaction, switching costs, alternative means of transportation [16]; consumer loyalty based on behavioral attitudes [61].
Preferences	Intention	Motivation
Preferences of city residents for public versus private transport to model transport preferences [62]; consumer preferences for environmentally friendly vehicles with low fuel consumption and emissions based on a study of six important vehicle characteristics [63].	The intention to use carsharing services and the impact on the intent of the intended benefits of sharing a car, perceived risks and burden of ownership, perceived values of car ownership, such as social status [64].	Motivation of car owners not to drive alone and to use environmentally friendly means of transportation, the impact on the motivation of variables such as parking fees, social discomfort, reduced costs of vehicle maintenance, and awareness of alternative means of transportation [65].

The above-mentioned scientific publications confirm the attention of researchers to the analysis of the variable behavior of potential and actual consumers of public transport services to justify and develop solutions to improve the competitiveness of public transport services in the current environmental problems of megacities. The identified nine variables of consumer behavior of the car drivers and car owners should be considered for further stages of the study of its individual basic values, because we consider the private car drivers/owners as an important segment of potential consumers of public transport services.

2.3. Axiological Approach to Consumer Behavior Research

Axiological approach to consumer behavior research is becoming more common in the scientific literature on the topic of sustainable development in various sectors of the economy. [16,18–28,39,40,66].

In total, since 1974, it has been indexed in the international scientific citation database, Scopus, and we found 1652 publications, according to the key words “environmental + consumer behavior + values”. The search and analysis of scientific publications in the Scopus international citation database dedicated to the study of consumer behavior on the basis of their values shows that researchers most often turn to theories and methods to study values. It can be found in the works of L.R. Keylie (10 papers), M. Rokeach (15 papers); Sh. Schwartz (74 papers) [18,29,30].

In order to narrow down the analysis a bit, the authors of this paper limited themselves to a set of keywords “consumer behavior + Schwartz + values” and “environmental + consumer behavior + Schwartz + values”, adding the scientist’s name “Schwartz” to the set of keywords due to more frequent application of the scientist’s value theory in consumer behavior research. Thus, the authors highlighted in Scopus 74 and 22 publications, respectively, and in the international search database, Web of Science (WoS), these numbers were 83 and 33 publications.

The analysis of publications found on this topic in Scopus and WoS databases shows the diversity of research in different branches of economy, subjects of purchase and sale, and the studied strata:

- Retail trade—eight publications; financial and banking sphere—two; textile and clothing industry—one; animal husbandry—one.
- Foodstuff—19 publications (including organic products—11); tourist and hotel services—seven; luxury goods—four; hi-tech products—three; cars—two; cell phones—two; sports goods—one; air transportation services—one.
- Youth—two publications; students—two; Muslims, Christians—one; generations—one; women—one; family—one; local communities—one.

Two publications from those analyzed are devoted to the study of the impact of values on the environmental behavior of consumers of passenger cars using the method of Schwartz.

A search of key words “environmental/sustainable + consumer behavior + car owners” for international publications on the study of environmental behavior directly to car owners, allowed to highlight 22 scientific articles on various topics of consumer behavior in cars (Table 2). Of these scientific articles, four are devoted to the study of environmental behavior of car owners/consumers based on the study of their value system, including one study based on the Schwartz method (Table 2).

The above analysis of statistics of the WoS and Scopus publications devoted to the axiological approach to consumer behavior shows the dynamic interest of scientists to this topic, along with the lack of research on this topic in the field of public transport and environmental problems developed by transport vehicles and evaluation of the values of private car owners as potential consumers for public transport.

Thus, the review of the authors’ research on the axiological approach to managing the competitiveness of public transport services in the context of unsolved environmental problems (even during the COVID-19 pandemic) of megacities has shown that foreign and domestic literature is not yet scientifically sound. Additionally, the systematic ideas about the study of values and their impact on the environmental behavior of potential and actual consumers of transport services in the selection of alternative modes of transport (substitutions) make it necessary to consider in this study.

Table 2. Papers on research of environmental behavior of car owners based on the study of their values.

International Research Topics	Keywords in Scopus and WoS Databases		Authors and Year of Publication in Studies (Refer to Column 3)	Research Subject in Publications (Applies to Columns 3,4)
	Environmental/Sustainable + Consumer Behavior + Car Owners	Environmental/Sustainable + Consumer Behavior + Car Owners + Values		
1	2	3	4	5
Factors influencing the change by car owners of an old car	1	-	-	-
Factors influencing the choice of an environmentally friendly car brand by car owners	2	1	[59]	Impact of respect for nature and environmental values of consumers on the perception of an automobile brand.
Passenger/car owner behavior and quality of environment	2	1	[22]	Environmental and social values are aligned with the dominant social paradigm.
Acceptance of environmental innovation by passengers/car owners	1	-	-	-
Perceptions by passengers/car owners of financial incentives for environmental behavior	2	-	-	-
Perception, attitude, and intention of passengers/car owners in terms of buying environmentally friendly cars	14	2	[20,67]	Consumer values focused on sustainable behavior based on Schwartz’s motivation types, a set of basic social values that affect the purchase of an electric car.
Total:	22	4		

3. Methods

In order to study the competitiveness of the public transport services in Moscow with the importance of the environmental degradation and individual basic values of the private car owners, which is reflecting its consumer behavior, the following conceptual research model was developed (Figure 1).

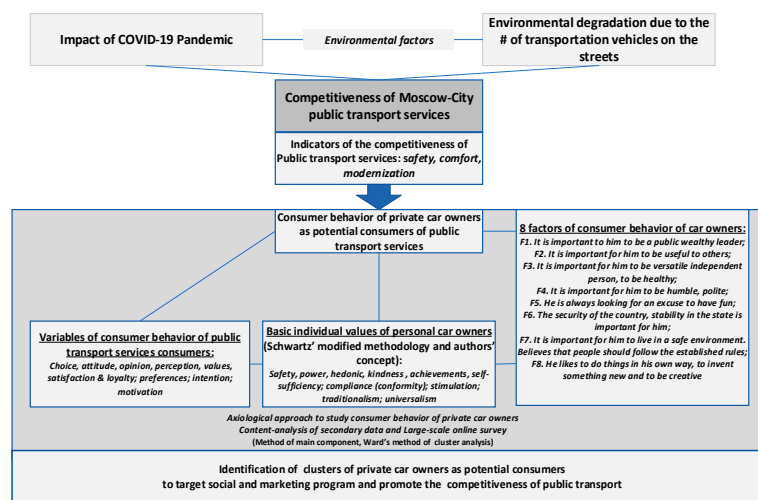


Figure 1. The conceptual research model of the assessment of the competitiveness of public transport services combined the impact of the environmental factors and potential consumers’ behavior (composed by the authors).

3.1. Desk Research Methods

The analysis of secondary data had combined the statistical method and content analysis of scientific studies on the competitiveness of public transport services and assessment of public transport competitiveness in Russia.

For the analysis of scientific research on this topic (literature review), only peer-reviewed articles of international and Russian databases of scientific citations were used (Scopus, WoS, Google Scholar,

RISC—Russian Index of Science Citation). This approach is due to the fact that the use of peer-reviewed articles provides the most relevant insights into the status and prospects of the research on the topic of managing public transport competitiveness. To search for articles that meet our research objectives, we conducted a keyword search (“public transport competitiveness” in the title of the article or a set of keywords) and then used the snowball method to analyze the cited literature. The research had met the following criteria:

- Study and assessment of the impact of various factors on the management of competitiveness of public transport services;
- Research of possibilities of transition of motorists or car owners from use of the car to consumption of public transport services;
- Study of a certain strata: the adult population of metropolises (18 years and older).

The articles found were assessed for compliance based on discussion and evaluation of the arguments, until a consensus was reached to include the articles in the research base. Initially, the search resulted in 349 publications. After their selection and analysis, 79 publications were admitted for further research.

To assess the competitiveness of public transport in Russia, the following materials were used: materials from government programs and transport development strategies; documents from statistical services; analytical reports on investment projects; information publications; analytical articles.

3.2. Field Research Methods

The methodological basis for the field stage of the study is an online survey of Moscow residents. To assess the competitiveness of public transport services in Moscow in early 2020 at the very beginning of the COVID-19 pandemic, a research was conducted to study the attitude of Moscovites to public transport and determine the intensity of its use in the period 2015–2020.

The study was conducted by the staff of the Plekhanov Russian University of Economics on the basis of a survey of private car owners using online panel, based on classical approaches to marketing research and the principles of Internet surveys of the European Society for Public Opinion Research and Marketing (ESOMAR). Survey data were collected using the platform Survey Monkey and then exported to the SPSS program for detailed analysis and identification of dependencies between variables. The online panel (database of respondents of OMI research agency) was used. The processes of conducting online surveys in this company is certified to International Standards Organization (ISO) standards. OMI consumer panel includes 72,193 respondents—Moscow City residents, including private car owners. For this study, 1263 respondents (private car owners) participated in the survey, and the stratified sample is representative by gender and district of residence. The sample of respondents was compiled in accordance with the structure of Moscow population by districts. The share of respondents selected for the survey in each district corresponded to the share of all population of this district in the total number of the city. The 1263 respondents were randomly selected in the strata of districts of residence by quotas inside of the OMI online panel.

The following points can be considered as limitations of using this sample:

- Development of the road structure in different city districts has significant differences, and because of that, the car owners cannot be motivated to change the transport mode;
- Respondents were selected only at the address of their residence, but data on their main routes by car to places of work and study located in other districts were not considered;
- Presence in the sample of permanent respondents, who became professional.

A modified Sh. Schwartz projection questionnaire was developed for this study and used to evaluate the values of car owners. The sample is representative of the representation of administrative districts of the city, the demographic characteristics of respondents corresponding to the characteristics

of the population of Moscow City. Factor analysis and hierarchical cluster analysis by the Ward method were used for the analysis of the obtained results.

4. Results

4.1. Analysis of the Secondary Data

The analysis of secondary data allows us to draw conclusions about reduction in the attractiveness and competitiveness of some public transport services for the Russian population.

In particular, the indicators of passenger turnover on the transport of common user in the 1st quarter of 2020 decreased by 4.5% compared to the same period in 2019. At the same time, different types of public transport show different dynamics of passenger turnover indicators: the highest positive dynamics is observed in air transport, the second place is occupied by railway transport, inland waterway, and road transport with a significant gap (Figure 2).

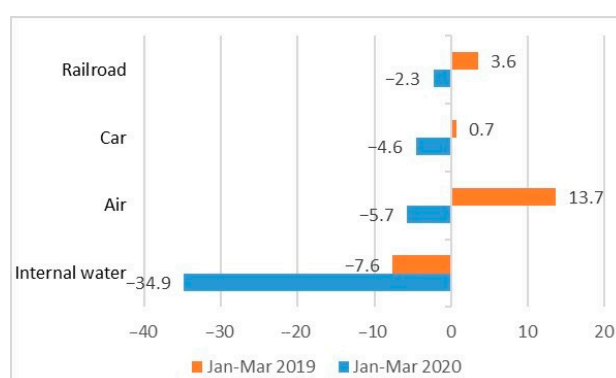


Figure 2. Dynamics of passenger turnover by type of transport in January–March 2020 and in January–March 2019, as a percentage of the same period in the previous year [68].

One of the reasons for decrease in attractiveness and demand for public transport services is growth of tariffs: during the 1st quarter of 2020 the tariffs change from 2 to 4 points upwards (Table 3, Figure 3). We can also assume that social vulnerability under adverse epidemiological conditions of the COVID-19 pandemic has had a certain impact on the competitiveness of public transport.

Table 3. Tariff indices for passenger transport services in March 2020 [69].

Types of Transport	Price Indices for March 2020, %	
	To the Last Month	To December of the Last Year
Motor transport	100.2	102.2
Travel by minibus, one-way trip	100.4	101.3
Travel by taxi, per 1 km	99.8	99.7
Travel in an intercity bus, per 50 km of track	100.1	101.1
Urban electric transport	100.0	104.5
Travel by tram, one-way trip	100.0	105.0
Travel by trolleybus, one-way trip	100.0	103.6
Subway travel, one-way trip	100.0	105.4
Air transport	94.0	91.2
Flight in an economy class aircraft, per 1000 km	94.0	91.2
Railway transport	100.4	98.8
Traveling on a suburban train, one-way	100.1	102.5
Travel in a compartment carriage of a quick long-distance train, per 100 km of track	104.3	94.3
Travel in a compartment carriage of a quick premium service long-distance train, per 100 km of track	104.5	94.0
Trip in a couchette car of a quick long-distance train, per 100 km of track	97.5	92.1
Trip in a couchette car of a quick premium service long-distance train, per 100 km of track	97.9	91.9

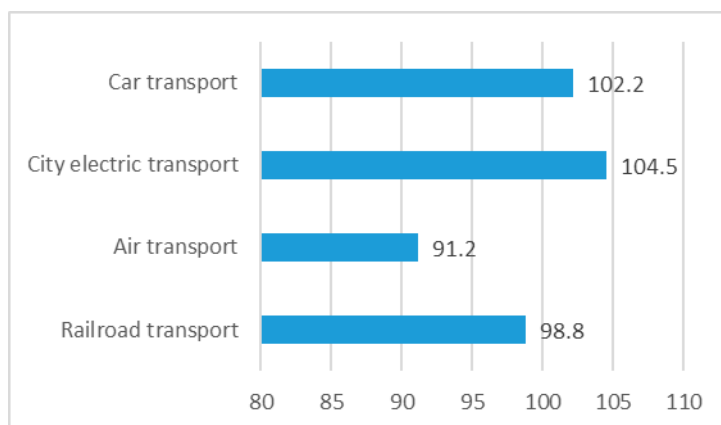


Figure 3. Index transport of tariffs for passenger transportation in March 2020 as a percentage of December 2019 [69].

Analysis of the data in Table 3 shows that in the category of “road transport”, a small negative trend appeared in the cost of cab services, and among all types of public transport, the highest growth of tariffs was observed for subway trips. Accordingly, we can assume that the competitiveness of transport services for subway travel is stable, which allows you to increase tariffs, but the competitiveness of cab services may decline in the case of higher prices for travel. Among all modes of transport, the air transport is becoming more accessible, which makes it more competitive (Figure 3).

From assessing the competitiveness of public transport, it is essential to note that in the group “motor transport”, a slight negative trend manifested itself in the cost of taxi services. Among all types of transport, the highest growth in tariffs was observed for the subway. On this basis, we can conclude that the competitiveness of the metro transport service is stable, which allows higher rates. The competitiveness of taxi services may decrease in the event of an increase in prices.

Management of competitiveness of public transport services assumes purposeful influence on the processes of production organization in order to create competitive advantages not only for the economic entities of the markets, but to a greater extent for the state structures. The analysis of state investments into development of public transport shows the uneven distribution of investments into different types of transport. The analysis of Table 4 data shows a significant growth of state investments in 2020 in comparison with the previous year for sea, river, and air transport modes (growth by 48–94 points). The volume of investments in the development of railway and motor transport over the same period decreases in the range of 1–9 points (Table 4).

Table 4. The federal budget performance in the sphere of transport in 2020 (million rubles) [69].

Federal Executive Bodies	To Be Funded in 2020	As a Percentage of the Last Year	Cash Performance for January–December 2019	As a Percentage of the Last Year	Cash Performance for January–December 2018
In general, for the Ministry of Transport of the Russian Federation as a subject of budget planning	1,099,310.7	106	1,036,747.8	112	924,435.1
Federal Service for Supervision of Transport	5278.1	91	5770.8	114	5059.6
Federal Road Agency	634,177.9	99	641,952.5	114	560,889.5
Federal Marine and River Transport Agency	80,631.2	194	41,526.5	106	39,122.0
Federal Air Transport Agency	68,168.4	148	46,021.7	122	37,603.1
Federal Railway Transport Agency	121,627.6	90	135,175.8	99	137,064.1
Ministry of Transport of the Russian Federation (Section 103)	189,427.4	114	166,300.5	115	144,718.8

4.2. Analysis of the Results of the Field Study

Collection and analysis of primary data allows us to estimate the degree of change in the competitiveness of public transport services in the megapolis of Moscow from the point of view of consumers, peculiarities of consumer behavior, and their correlation with the basic values of citizens. The analysis of primary data shows the degree of change in the intensity of private car use over the past 5 years in Moscow City (Figure 4).

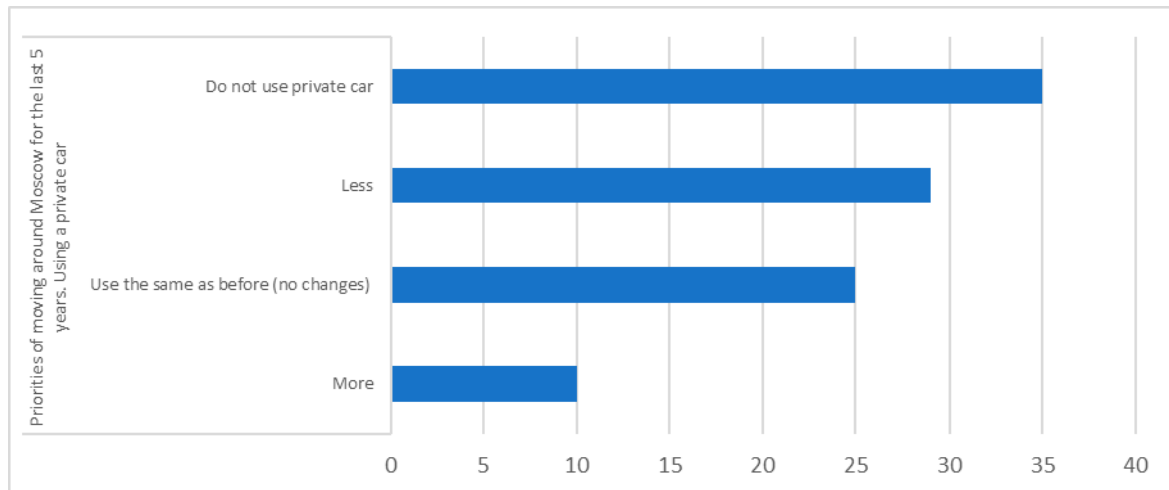


Figure 4. Intensity of private car use over past 5 years in Moscow City.

The share of respondents who use a car less was 17.2%, which is a noticeable sign of increasing competitiveness of public transport. These results do not mean that respondents completely abandoned the use of cars but began to drive less often or at shorter distances.

The reasons for reduced use of private vehicles are mainly related to the quality of public transport and the cost of car ownership (Figure 5).

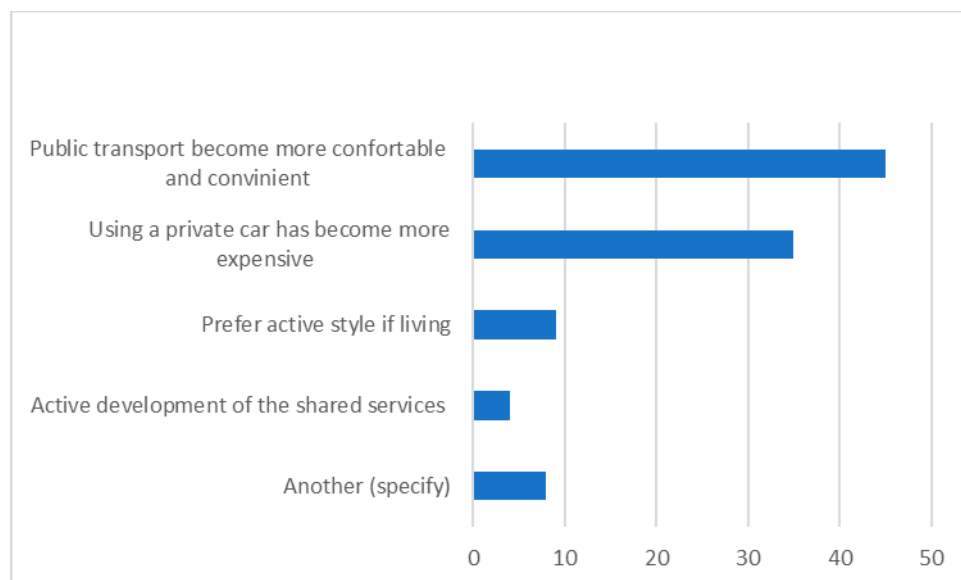


Figure 5. Reasons for reducing the use of personal car.

The main reason for the decrease in the use of a private car was the respondents’ assessment of public transport as more convenient (45%), while the second place was occupied by an increase in the

cost of owning a private car (36.4%). At the same time, over the past 5 years, 6.2% of city residents began to use a private car more for the reasons shown in Figure 6.

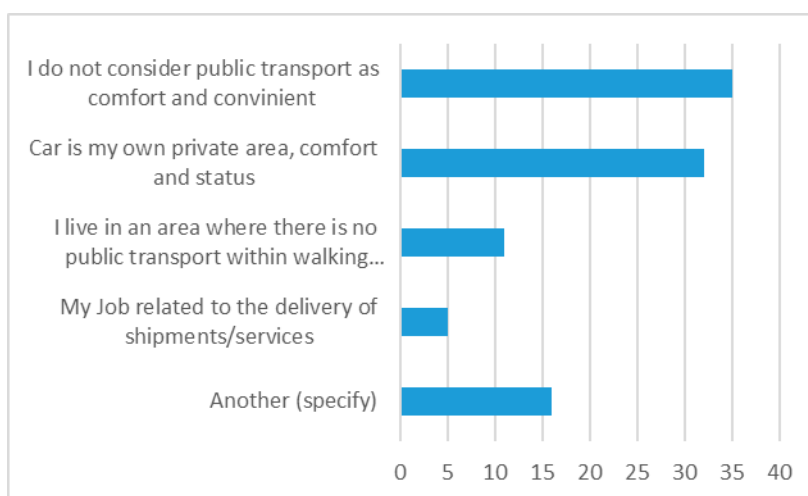


Figure 6. Reasons for increased use of personal cars.

The first reason by frequency of answers is the perception of public transport as inconvenient; it was mentioned by 35.2% of respondents, who began to use their personal car more often. The second most frequently mentioned answer (33%) is related to the perception of the car as a personal space, feeling of comfort, and status demonstration. Of respondents, 10.4% answered that they do not have in step availability of public transport stops in their place of residence; 5.3% reported that their work is related to the delivery of goods or services. The answer “other” was given by 16.1% of the respondents, and the main reason for them was a shorter and more convenient road to work in a private car, as well as a work schedule that makes it more convenient to travel by private transport.

The difference in the share of respondents who reduced and increased the use of a car is 11% (17.2% of those who use a car less; 6.2% use it more). This confirms the assumption that efforts to improve Moscow’s transport system have a positive effect in terms of increasing the competitiveness of public transport services.

It is important to note that the main reason for changes in the use of private cars was the perception of public transport. Among those who reduced the use of a car, 45% did so because they perceived it as more convenient, and among those who increased the use of private cars, 35.2% expressed the opposite opinion about the condition of public transport; in their opinion, comfort decreased.

It can be assumed that individuals living in one large city may perceive public transport differently—its comfort and reliability—for different reasons. The first objective reason may be that respondents live in different districts and specific places of the city. The public transport network does not have complete uniformity; in some places, there are no convenient routes of land transport or high-speed stations, while in other areas, there are metro stations, but the line is heavily overloaded, and it is objectively uncomfortable to use it. Another reason, in our opinion, is a subjective assessment of the condition of public transport and its comfort to passengers. It is logical to assume that the difference in assessment stems from the characteristics of consumer behavior based on their values. The study of individual values can give a new impulse to understanding the peculiarities of perception and attitude towards public transport, making decisions to improve its competitiveness.

According to the results of the survey of motorists, who by their choice declare the perception of public transport as non-competitive, such universal values as safety, universalism, and independence by the Sh. Schwartz method were revealed (Figure 7).

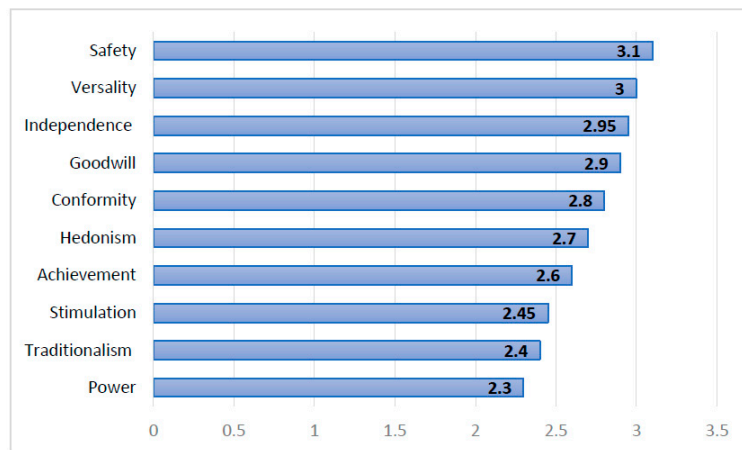


Figure 7. Average estimates of the significance of universal values for car owners.

For more detailed analysis of the obtained results, a factor analysis was carried out, for which eight synthetic variables (factors) were synthesized from the total number of initial variables used in the Sh. Schwartz method questionnaire. A statistical tool for dimensional reduction, the Main Components Method, was used to select the eight factors, while the Varimax Factor Structure Rotation Method was used for interpretation. Interpretation of the data made it possible to determine the connection of the factors with the basic values of car owners—potential consumers of public transport services on the basis of the initial variables (Table 5).

Table 5. Table of concordance of factors with basic human values of car owners (by number of corresponding initial variables).

Factors	Core Values									
	Safety	Power	Hedonic	Kindness	Achievement	Self-Sufficiency	Compliance (Conformity)	Stimulation	Traditionalism	Universalism
F1. It is important for him to be a public wealthy leader		3			3			2		
F2. It is important for him to be useful to others, sensitive, fair, devoted to his friends and respectful to the elderly				3			2			3
F3. It is important for the subject to be a versatile independent person, to develop constantly, to be healthy	2				1	3				1
F4. It is important for him to be humble, polite; he thinks that people should be satisfied with what they have; he tries to see only good things in people				1			3		2	
F5. He is always looking for an excuse to have fun; he likes not to deny himself anything, loves surprises, cheerful			3					1		
F6. The security of the country, stability in the state, and religion are very important for him.	2								1	
F7. It is important for him to live in a safe environment, believes that people should follow the established rules	1						1			
F8. He likes to do things in his own way, to invent something new, and to be creative						1				1

According to the data of Table 5, we can draw a conclusion that from the point of view of respondents there is a stable positive connection between different basic values:

1. Power–Achievement;
2. Benevolence–Consistency (conformity)–Universalism;
3. Security–Achievement–Autonomy;
4. Benevolence–Compliance (conformity)–Tradition;
5. Hedonism–Stimulation;
6. Security–Tradition;
7. Safety–Compliance (conformity).

Further, the respondents were classified by means of hierarchical cluster analysis using the Ward’s method. As a result, seven clusters of Moscow car owners were identified and their description was made (Figure 8, Table 6).

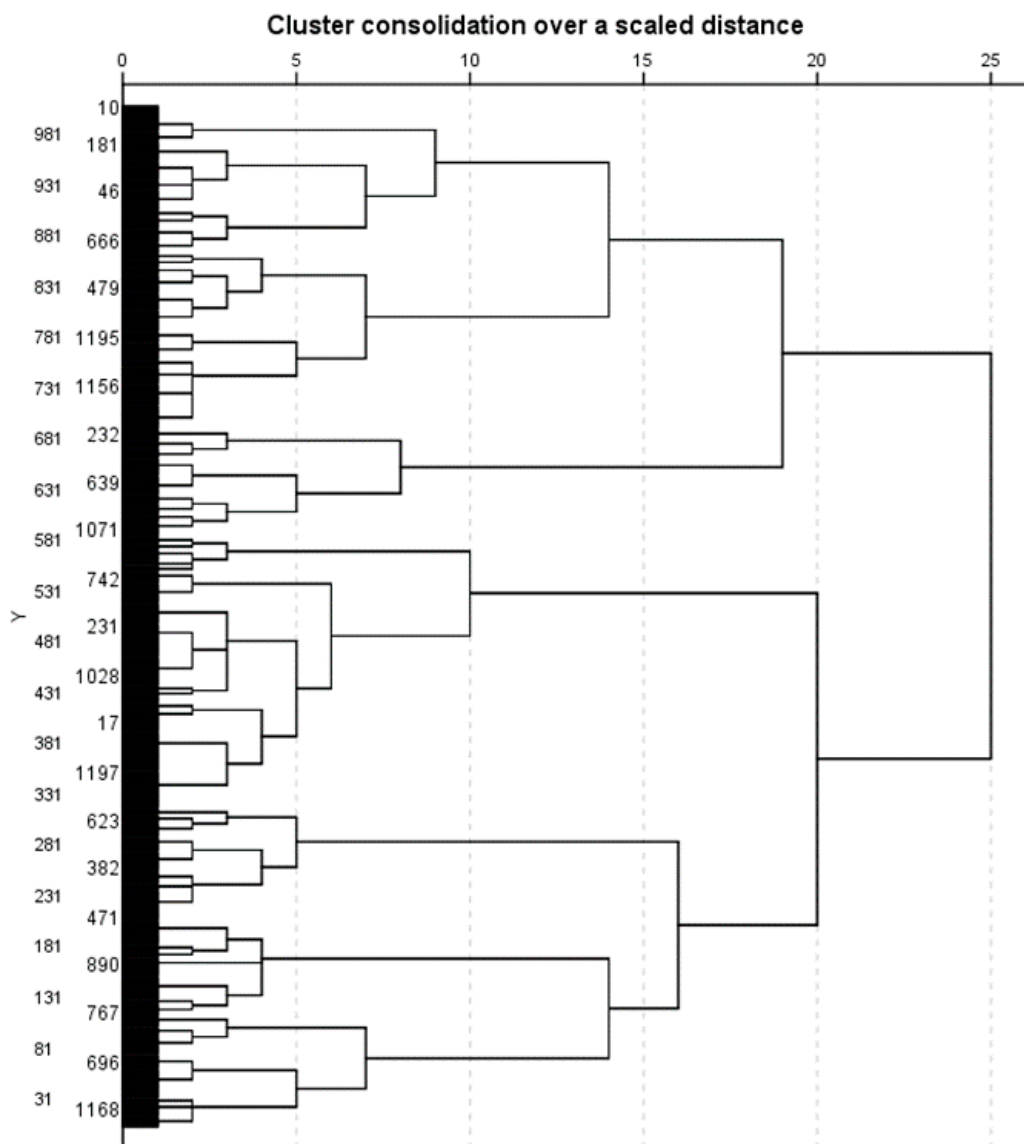


Figure 8. Dendrogram based on the results of cluster analysis of respondents (car owners) on eight factors (Ward’s method).

Table 6. Dimensions and shares of respondent’s (car owners) clusters.

No.	Number of Respondents	Size of the Cluster, %
1	172	17
2	109	11
3	111	11
4	95	9
5	147	15
6	267	26
7	106	11

Based on the results of the analysis of cluster profiles (graphs of mean values of factors—Figure 9), we can characterize the clusters in relation to car owners—potential consumers of public transport services to the core values.

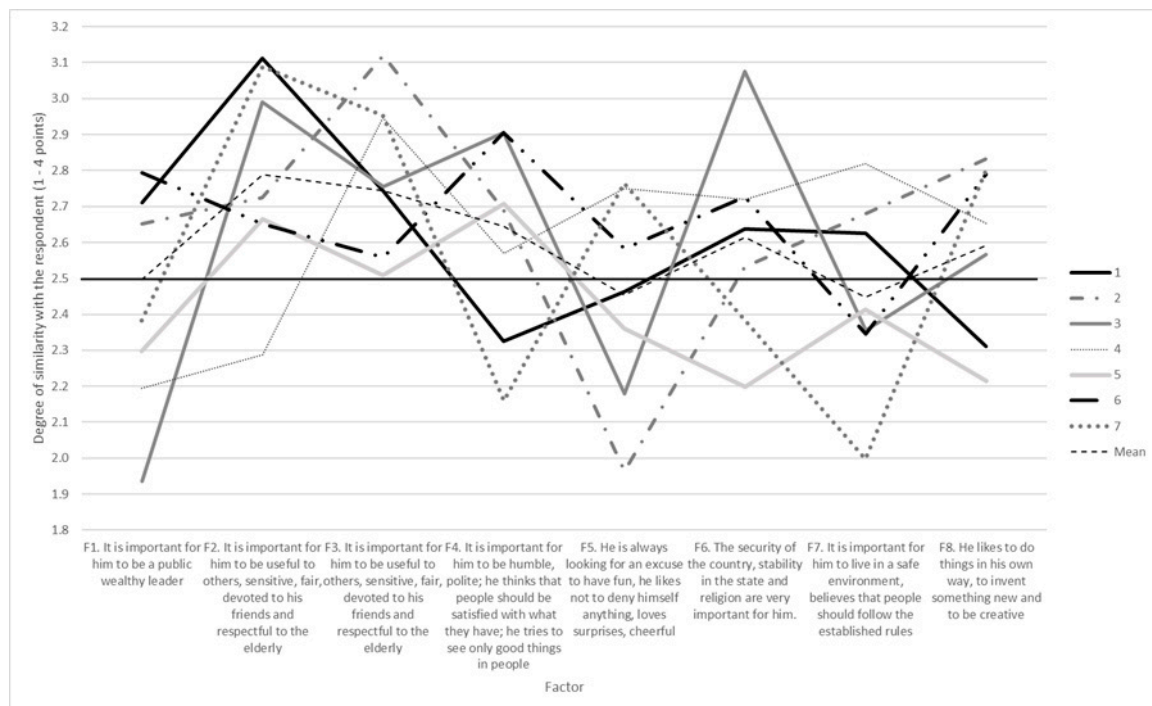


Figure 9. Graph of average values of factors of 7 clusters in relation to car owners to basic values.

- Cluster 1 “leader–altruist” aims to become a public leader, fair, and useful for others.
- Cluster 2 “purposeful inventor” is versatile, independent, inventive, alien to entertainment.
- Cluster 3 “humble peacemaker” is polite, sees people as good, alien to leadership and wealth, appreciates the security and stability of the state, and is religious.
- Cluster 4 “idle egoist” life loving, loves entertainment, appreciates the safety of the environment, adheres to the rules of society but is not going to be useful to it.
- Cluster 5 “lost interest in life” does not aspire to versatile development, health, nor is it religious, nor does it value the security and stability of the state.
- Cluster 6 “leader of the people” is modest, polite, inventive, sees good in people, likes to do things in his own way, strives for public leadership.
- Cluster 7 “altruistic adventurer” inventive, a stranger to modesty, loves to do things in their own way, looking for a reason to have fun, does not consider it necessary to adhere to the rules, sees in people both good and bad, it is important for him to be fair and helpful to others, but it is not important to live in a safe place.

Analysis of the size and share of clusters of car owners (Table 5) shows that the largest clusters 6 and 1 together make up 43% of automobile drivers. Characteristics of these two clusters have common features—a desire for leadership and a desire to improve public life. These clusters can be defined

as target segments for public transport enterprises and state, municipal structures (departments) in the field of public transport that make decisions to improve the competitiveness of public transport services and increase the positive perceptions of the public transport instead of individual cars use. The identified clusters of consumers (personal car owners) with different value orientations should be motivated via different social and marketing programs to change their intention to use public transport instead of personal cars, because of considering the environmental problems of the city and also because of the implementation of different innovative approaches to improve the public transport competitiveness during the COVID-19 pandemic—disinfection to improve safety as a main value.

5. Discussion

The results of the desk research do not allow making unequivocal conclusions about the decrease in competitiveness of all public transport services. Current indicators of passenger turnover in the short term (Q1 2020) compared to the same period in 2019 show an increase in the competitiveness of air and water transport, along with a decrease in the competitiveness of rail and road transport. Changes in the competitiveness of services of these public transport modes are due to the presented data on changes in tariffs, uneven distribution of public investments, as well as unpredictable environmental factors: the COVID-19 pandemic and oil geopolitics. At the same time, the results of a survey of car owners, conducted on a long-term consumer online panel, showed an increase in the proportion of respondents who began to use the car less frequently within a five-year period. This behavior of car owners can be seen as a noticeable sign of increasing competitiveness of public transport services in the metropolitan area. The main reasons for the reduction in the use of private cars by residents of the metropolis are more comfortable and convenient conditions for movement of public transport, increasing the cost of car ownership.

The authors define the competitiveness of public transport services as a set of properties of the services, which determines the degree of satisfaction of ancestral and derived needs, obtaining added values that correspond to the value orientations of individuals in the consumption of public transport services in comparison with the movement of alternative means, including in a personal car. In connection with this approach to understanding the competitiveness of the services of the same name, the author's position regarding the application of axiological approach to making managerial decisions to improve the competitiveness of public transport services has also been formed. The consumer makes a choice between substitutions that meet the generic and derivative needs for mobility, moving to different distances on the basis of a system of values and value reference. Accordingly, the answer to the above question "how to transfer people (car owners) from personal transport to public transport?" lies, among other studies, in the plane of studying the value orientations of potential consumers of public transport services—for car owners to understand the values sought, creating and communicating these values in the provision of public transport services.

The conducted survey of car owners—the potential consumers of public transport services according to the modified survey of Sh. Schwartz—allowed us to determine the connection of factors of influence on the personality profile with the basic values of car owners on the basis of initial variables. The analysis of the personal profile of car owners showed a stable positive connection between different basic values. Seven clusters of Moscow car drivers were identified and described based on the results of the analysis of the car owners' personality profiles. Selected large clusters, conditionally named according to the dominant core values "leader-altruist" and "leader from the people", economic entities of the public transport market, and state/municipal structures may be considered as target segments. Studied value orientations of potential consumers of public transport services in these segments can be the basis for the development of differentiated social and marketing programs to create and communicate the added values in the consumption of individuals of public transport services. A differentiated approach to creating and communicating values that are consistent with the value orientations of consumers will be the basis for increasing the attractiveness/competitiveness of public transport services in the minds of consumers.

Creating value for potential consumers of public transport services can be expressed in the following ways: improving the consumer properties of services, creating added value services in order to provide individuals with the opportunity to choose between different mobility options and their combination within the framework of intermodal mobility, encouraging non-motorized modes of transport, restricting the use of private cars, creating pedestrian zones, planning cities for environmental mobility rather than for a car, and planning sufficient for the use of cars [8,19–21,28,36,39,40,70–72].

An important direction of current and future research may be to study the basic values of potential consumers of public transport services in the dynamics and determine their correlation with consumer choice of alternative modes of transport.

Additionally important is the holistic view of the metropolitan public transport system and its distinctive features in comparison with the characteristics of personal car use patterns, proposed by Raymundo and Reis [73]. Thus, public transport should be slow, cheap, safe, providing different levels of comfort in different situations, and the use of private cars can be expensive, but giving an advantage in speed and comfort. Thus, the issue of competitiveness of public transport can be considered in terms of important values for the individual in choosing the means of mobility.

Another important area of current and future research is the assessment of the competitiveness of certain public transport modes. For example, Astengo et al. [74] examine the competitiveness of trolleybuses in the urban environment with respect to buses with diesel engines. The complexity of assessing the competitiveness of alternative modes of transport in this case is determined by the need to consider not only the cost of operating trolleybuses and buses and the level of their impact on the environment, but also the value perception of consumers of their competitive advantages. As new or improved types of transport emerge, such research will get a new round of relevance.

Comprehensive consideration of aspects of competitiveness of public transport services may lead to the need for very specific, narrowly focused research, such as the impact of the level of perceived comfort of waiting for transport at a stop on the intensity of use of public transport [75]. Such studies give rise to the need to identify the psychophysiological needs and values of actual and potential passengers in a situation of forced waiting, which should be perceived as safe and uncomfortable.

Innovative Approaches to Transport Policy in Megacities in the period of the COVID-19 pandemic is explained in the research of Sidorchuk et al. [76,77], where researchers studied the worries of passengers of the environment of the transportation station, and in order to take it into consideration, the management should take the innovative and technological decisions. The innovative approaches of transformation of the existing business models are explained in recent publications of JinHyo Joseph Yun et al. [78,79], which should be studied more attentively to adapt it to management of public transport of the megacity. It could be possible to develop these ideas not only in technological terms, but also in the field of managing the competitiveness of public transport. With regard to this sphere, we can talk about public transport management as an “open system”. Considering the personal basic values of car owners, along with economic, environmental, socio-demographic factors, will contribute to the effectiveness of management decisions to improve the competitiveness of public transport.

6. Conclusions

The axiological approach to studying customer values of the private cars' owners in Moscow City helps us to identify the list of individual values of the car owners as potential passengers of public transport. The car owners value the environmental problems of the city, which is made by the quantity of transport vehicles in the city, and at the same time, the increase in the comfort, convenience, and safety of public transport for the last several years impact on the perceived attractiveness of it to potential customers. We considered the most important variables of the consumer behavior of the car owners in relations with transport services of public transportations; among them are choice, attitude, opinion, perception, values, satisfaction, and loyalty. All of them are well described in the variety of publications, but we discovered that for the developing countries there is not enough research about perception of the competitiveness of public transportation in the eyes of the potential customers, but at

the same time, this is one of the most important problems: to motivate car owners to leave their cars and make a choice to use public transport. The environmental situation with COVID-19 also created an unpleasant impact on the customers' decisions.

The content analysis and snowball axiological approach of the of the 22 research papers, which are described the consumer behavior of the car owners in large cities, including the concern about environmental problems, helped to identify the list of 10 individual values that helped us to create a list of the most important values for the potential consumers of public transport: safety, versatility, independence, goodwill, conformity, hedonism, achievement, stimulation, traditionalism, and power, related to the theory of individual values of Sh. Schwartz. These values and correspondence with the values of the environmental problems of the megacity of Moscow and the readiness of car owners to change their preferences to the different modes of public transportation were evaluated with the help of the largescale online survey of 1263 respondents. The survey had shown that 45% of the surveyed consumers (car owners who live in Moscow) evaluated that public transport became more convenient. At the same time, 36% of the respondents showed the concern with the costs of owning private cars. These facts in accordance with the analysis of statistics of the investments and funds of the public transportation and transport infrastructure development in Moscow City helped to confirm the assumption that the efforts to improve Moscow's transport system have a positive effect in terms of increasing the competitiveness of public transport services in the minds of the potential consumers. Eight synthetic factors of consumer behavior of the car owners were selected with the help of the Main Components Method. The Varimax Factor Rotation Method was used for the interpretation and building the concordance between factors and core individual values of the potential consumers of public transport. Ward's Method of the Hieratical cluster analysis was used afterwards, and seven clusters of Moscow car owners were identified and described. Two of the largest clusters of respondents (by number) together make up 43% of automobile owners and drivers. These clusters (segments of potential consumers of Public transport) have common features: a desire for leadership and desire to improve public life. We assume that these features can be well managed by the innovative management approach in format of the educational and informational marketing program to promote the ideas of safety to the public (even during COVID-19 pandemic), to the environment (ecology) of the metropolis, and finally, to improve competitiveness of the public transport system. The results open the way to the implementation of a paradigm of innovation management at Moscow's city public transportation, through the benefits of open innovation. Open innovations offer several advantages to the Moscow Department of Transport and Transport Infrastructure Development. In the case of this research, these benefits can be realized through implementation of the marketing approach to customer (potential customer) orientation and building their preferences and customer choice towards public transportation, instead of using private cars. Differentiation of social and marketing programs as management innovations can be used to create and convey values of different target segments via specified and targeted marketing communications. The basis for positioning of public transport services in the minds of target segments will be the basic values of car owners along with environmental values as well as basic universal values such as safety of public transport during the COVID-19 pandemic.

The complex research approach of the study, which includes the desk research and content analysis of the research papers and field research of the car owners with help of the modified by authors questionnaire of Sh. Schwartz, opens up the potential for synergy between internal and external innovations. However, with the interesting results of this study, several limitations of the results appeared. We study the opinion of only private car owners of Moscow, who are registered in the consumer online panel of the OMI research agency, and this fact limits the opportunity for other car owners/car drivers (who are not in the database) to participate in this research. We had considered that the sample of respondents can be evaluated only as part of the whole amount of the consumers of the public transport services. For planning the scope of further study, the additional investigation of the competitiveness of public transport for other groups of potential consumers can be organized,

for instance for those who can combine the different transport modes in one trip (including the new rapid rail transport Moscow Central Diameters, which now links the center of the city and Moscow's suburbs). So, the detailed study for the development of a full list of the competitiveness indicators of Moscow's City Public Transport Complex can be organized. The results of this kind of study can also be adapted to other metropolitan areas in other megacities in Russia and other developing countries.

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