Issue of environmental factors in the implementation of public policy in the northern cities of Russia

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Abstract. The article considers the problem of the development of public policy priorities in the northern territories through the example of the solution of transport problem. According to the studies, it is concluded that, when planning the development of the transport infrastructure, it is necessary to take into account specific environmental factors and restrictions that are typical of northern cities, which are caused by environmental conditions with low self-restoration potential. This specificity makes it impossible to mechanically transfer the advanced foreign experience of countries with a warmer climate to solve this problem. The study conducted sociological surveys among vehicle owners in order to find out whether motorists are aware of the degree of environmental danger and whether they are ready to participate in the solution of environmental problems of the coexistence of vehicles and urban areas. The results of the surveys showed that the vast majority of motorists are aware of the environmental danger to the urban environment from increasing motorization. They express their readiness to obtain and put into practice the necessary knowledge to improve the environmental situation.

1. Introduction

Nowadays the problem of the ecological state of urban areas, especially northern ones, requires its solution, since the Russian northern territories, which are rather vulnerable landscapes in the environment with a low potential for self-restoration, and, as a rule, are highly urbanized. The aggravation of the environmental situation in the northern regions of Russia is associated not only with the active increase in industrial potential and the intensive development of housing construction, but also with the increase in the number of road transport.

Northern cities, as a rule, have a high level of motorization. People living in them use personal transport not only for convenience, but also as the most affordable and optimal, and sometimes the only way to travel in conditions of negative and low temperatures, prolonged rainfall, strong winds and long distances. However, in conditions of increased motorization, new problems appeared – the congestion of road network, pounding of traffic, clutter of yard areas, street driveways with parked cars and an acute shortage of parking spaces and, accordingly, environmental degradation in the adjacent territories. Thus, the solution to the problem of the ecological state of cities is to resolve the contradictions in the mutual coexistence of cars and urban areas, especially northern ones [6].
One of the largest and most polluted northern Russian cities is St. Petersburg, and the vast majority of administrative centers. Taking into account the lack of consensus on the definition of the southern border of the North in Russia, Magadan, Arkhangelsk, Krasnoyarsk, Novodvinsk, Norilsk, Monchegorsk, Nickel, Novokuznetsk, Magnitogorsk, Cherepovets, Nizhny Tagil and others can also be classified as disadvantaged cities.

Thus, it is especially important to take into account, within the framework of public policy, one of the most acute areas of the solution of the issues of personal vehicles use, environmental factors, which causes a specific background for the studies described in the work [5].

2. Methods and materials

As research materials, the authors used the data from longitudinal studies of scenarios for the use of personal vehicles in northern cities, as well as the environmental consequences of the accompanying phenomena: excessive motorization, garage storage, problems of road congestion and super-emissions of pollutants as a part of the non-optimal mode of operation of non-stationary power plants in winter time. The concentration of pollutants was measured during the year in four northern cities with a combination of factors in different configurations: weather, road conditions, combination of the storage method and the period of warming up a car in cold weather and air conditioning in warm season. Based on the results of the isolation of certain factors, a regression analysis was performed and conclusions were drawn about the most environmentally friendly options for using personal road transport in the northern cities, as well as the necessary adjustments to the training program for future drivers.

The research methods that actualize the problems of behavior and individual choice in the context of public policy in the field of transport and ecology were sociological methods aimed at the identification of the level of awareness and the degree of rationalization of everyday choice among motorists. Sociological studies were conducted in five rounds between 2017–2019 and covered a total of 1,700 motorists (February 2017 – 350 people were surveyed, November 2017 – 350 people were surveyed, July 2018 – 500 people were surveyed, April 2019 – 500 people were surveyed) from 18 to 65 years old. The survey was conducted in the form of questionnaires using age, gender and professional quotas. The respondents were the following categories of motorists in typical situations and scenarios for using vehicles: students taking courses in driving schools; taxi drivers, including such services as “Yandex Taxi” and “Uber”, car service visitors awaiting diagnosis or repair results; motorists who park vehicles in parking lots near office centers.

In addition, the comparative analysis was widely used to identify best practices for the solution of the problems of personal vehicles use in northern cities, as opposed to the so-called “best practices”, which are often thoughtlessly transferred to inappropriate conditions. In particular, the approaches to the solution of the problems of motorization typical of large cities of foreign countries in the historical perspective were analyzed – in the 1930s–1940s, in the 1960s–1970s, in the 1990s–2000s, and also regionally: in the countries of Northern and Southern Europe, Southeast Asia, North America. Moreover, the current environmental situation in the city and the current consequences of the accumulated problems of motorization was taken into account. The analysis was aimed at the isolation of the weather and climate factor (in some cases it was difficult to do this due to the unavailability of information about repeated weather disasters and typical scenarios for overcoming them in urban conditions).

In general, the methods and materials described and used in this study allow drawing a reasonable conclusion about the optimal solutions for the implementation of public policies in the field of transport and the environment, as well as directions for their further improvement.

3. Results
As the analysis showed, in order to solve the problem of the collision of cities and cars, the representatives of Russia prefer to focus on the experience of countries with a fairly warm climate. The experience of Germany, France, Great Britain, the USA was studied in detail, but the average annual temperature of St. Petersburg is 4.9 °C, Moscow – 4.9 °C, Krasnoyarsk – 1.4 °C, Arkhangelsk – 0.8 °C, Monchegorsk – 0.8 °C, Murmansk – (–0.2) °C, Magadan – (–2.8) °C, Norilsk – (–10.2) °C, and is below in other cities. For comparison, the temperature of Paris is 11.3 °C, Berlin is 9.1 °C, London is 11.1 °C, Amsterdam is 9.2 °C, Washington is 13.3 °C, and New York is 12.1 °C. [9].

As the so-called “best international experience” shows, city streets should belong to pedestrians, public transport, cyclists and urban mobile services. It is believed that such measures will reduce traffic on the streets, increase speed, passenger traffic by public transport and the number of free parking spaces. Certain European and North American cities, in fact, have achieved some positive results in the field of traffic optimization, the spread of new models of using personal vehicles by partially or completely abandoning it in favor of public transport, “car sharing” or “carpooling” along with using a bicycle [2, 4]. The important role of such events was played by a significant change in the appearance of cities, a departure from automotive-centric planning decisions in favor of the principles of the organization of urban space that are comfortable for pedestrians, cyclists and public transport.

Nowadays the issue of the withdrawal of passenger transport from the historical and central regions of St. Petersburg, the priority of public transport and the prohibition of the construction of parking in city center is actively discussed [1]. However, as the analysis showed, on average, even in the countries of the European Union, 50 % of urban transport is in cars, 12 % on foot, 20 % by bus, tram, metro, 15 % on bicycles and mopeds, 3 % on urban rail way. Therefore, the townspeople still give priority to passenger transport. This data is of quite warm countries in comparison with Russia [10].

The process of reformatting the public city space in favor of pedestrians and cyclists is an integral part of successful change in the vector of public policy in the field of transport and the solution of the environmental problems of cities. Often, there is a schematic transfer of models and methods of other cities without taking into account the diverse and multilateral related phenomena, which include climatic conditions. Also, the social environment and the phase of the cycle of socio-economic modernization of the country are not taken into account. In particular, in the center of the Russian metropolis, contrary to the logic of capitalism, low-income sections of the population live, who use a personal car because habit or tradition. Gentrification, which affected most of the city’s districts in foreign countries, in St. Petersburg manifested only in relation to the former industrial zones, leaving the problem of communal apartments unresolved.

The problems of the northern territories are also clearly manifested during street cleaning in cold season: inconsistencies in the work of urban utilities turn a walk along the sidewalk in winter into a dangerous adventure, which, along with seasonal difficulties in the organization of transport systems, lead to a predictable choice of personal transport as a means of transportation.

In addition, within the framework of the mechanical transfer of advanced European experience, special public transport lines have already been introduced in St. Petersburg, bicycle lanes have been created and paid parking lots have been organized in order to reduce traffic. Paid parking is organized on 27 streets of the Central district and is designed for 2800 cars. However, the most popular parking lots among the population, as before, are mostly free of charge: courtyard territories, street “canyons”, “pockets” in courtyards and streets, areas near buildings and offices.

The realities of life show a rather unhappy picture of the introduction of such approaches, especially in the cold season. As the analysis showed, city parking space was taken away from motorists, deprived of their freedom of movement in the city center, and no alternatives were created. The metro is not always convenient when traveling to neighboring areas and usually it is overloaded. Trams in the city center are not everywhere, like buses and trolleybuses; they are crowded and in traffic jams. The waiting periods for public transport are long enough. There is often no heating in winter and ventilation in summer, etc. Therefore, many motorists prefer to stand in traffic than to travel by public transport. Multilevel parking in the city center is in demand, but is not able to solve the problem.
Parking lots on the outskirts of the city are too small and inconveniently located, and they are not located at all terminal metro stations. For most citizens, it is not affordable to pay for parking. Paid parking does not work at full capacity, it is often empty. In general, 12 % of citizens park cars in paid parking lots for a period of more than 3 hours, 32 % – for a short time. Approximately 20 % of parking spaces are occupied by cars of local residents on preferential terms. The rest of the car owners prefer to park their cars on the streets bordering the paid area, in the yards, to park during free hours (from eight in the evening to eight in the morning). The desired picture of “free space” is observed only in the areas where paid parking lots are located, and outside of them the number of traffic jams has increased, and cars parked in all possible ways make traffic even more difficult and clutter the territories [7].

Congestion, low-speed movement, braking, parking in all possible free spaces, starting and warming up car engine (especially in winter) in narrow streets, tall buildings, backyards and well-yards with insufficient aeration and insolation, and especially subzero temperatures create a life-threatening urban environment (10–12 MPC).

The situation is aggravated by climatic conditions, since the winter period lasts about five months, and in other cities it lasts even longer, the factors such as low temperature, temperature inversions, wind, pressure, humidity, snow, etc., significantly affect the organization of operation, car storage, their technical, economic and, accordingly, environmental indicators, which ultimately leads to increased wear of engine, units and mechanisms of a car, excessive fuel consumption and, consequently, increased emissions of harmful substances in the environment, the occurrence of stagnant zones with a significant excess of MPC. All these aspects contribute to even greater pollution of the urban area and increased incidence of population. [6]

Taking into account the harsh Russian climatic conditions in most parts of the country, the vast expanses of cities, the lack of public transport, usually outdated and uncomfortable, it is necessary to create infrastructure, but accessible to the public, but partially paid. The way to solve the problem is as follows: from expensive open parking to “smart parking” with differentiated payment [3, 11].

As it is shown in the works [6, 8, 13], open parking lots and parking lots located at a distance of more than 50 meters from the building are not dangerous, which is practically impossible in the conditions of the city. Therefore, all improvised parking lots and open organized car parks are a source of increased environmental hazard. Open ground multi-level parking can be dangerous. Therefore, it is necessary to pay attention to multi-level underground parking and ground parking of a closed type. Such parking with a competent, environmentally-friendly approach, can not only park a huge number of cars and be an adornment of the city territory and an element of landscaping, but also fully ensure the ecological purity of the environment and preserve the health of the population [12].

However, what do vehicle owners think about this, are they ready to contribute to the solution of this problem? In this regard, from 2017 to 2019, three sociological surveys were conducted to find out whether motorists are aware of the degree of environmental hazard and are they ready to participate in the solution of the environmental problems of the coexistence of motor vehicles and urban areas? During this period, 1,700 vehicle owners aged 18 to 65 were interviewed.

In general, all respondents are aware of the danger posed by cars. As the survey showed, 95 % of motorists know that a car is a source of increased environmental pollution, and 90.6 % have an idea of what danger a car poses to human health. Only 63.2 % know that the most acute environmental situation arises in places of car parking. 42.1 % of respondents know about the danger of parking emissions.

In general, all survey participants, namely 97.5 %, are aware of the fact that a significant increase in personal vehicles exacerbated many urban problems, some of which are congestion and lack of parking spaces in historic, central and residential areas.

The motorists are aware of the ideas of the optimization of car traffic in the city (91 %), however, only 47.5 % of the survey participants see the solution to the problem of urban areas as a priority for public transport, which 52.5 % of the participants consider uncomfortable and unattractive. In order to
improve the environmental situation in the city, no more than 46% of respondents are ready to change a personal car to public transport.

However, 52% of the respondents are ready to move around the city on foot in order to create a favorable transport and environmental situation, while the other 50% prefer to use the services of transport. Only 32.5% of respondents preferred moving around the central and historical zones by public transport. 63.2% of respondents agree with the need to create parking lots at the entrance to the city for the purpose of further transfer to public transport. However in general, 11.3% preferred walking around the city, 22.4% – by public transport, 71.7% – by personal car.

Only 12.5% of the survey participants agree that open surface car parks should be paid and expensive. Accordingly, 87.5% of respondents are against the introduction of parking fees. However, if necessary, 10% are ready to pay less than 50 rubles per hour for temporary open parking, 35% – 50 rubles per hour, 15% – 100 rubles per hour, 15% – 150 rubles per hour, 5% – 200 rubles per hour. No one wanted to pay more than 200 rubles per hour, and 20% are ready to use parking services for free.

The need to build a network of parking lots throughout the city, since 80–90% of the time a car stands, and does not move, is seen by 72.5% of the participants. According to the survey, 94.8% of the participants are ready to put their cars in a parking lot, 93.7% of the participants consider the construction of parking lots necessary for the city. 81.1% of respondents believe that parking, aboveground and underground, should be located in the most attractive and convenient places for the citizens of the city. The preferences are distributed as follows: 53.2% of the respondents chose a multi-level parking lot, 35.9% – an underground parking, 15.6% – an open ordinary parking lot.

According to the survey, in the climatic conditions of St. Petersburg, 52.5% of respondents would like to come to the center and put their car in the parking lot, 32.5% are ready to leave a car at the entrance to the city and come to the center by public transport, and 11.3% – are ready to leave the car outside the center in a parking lot and move on foot.

The study showed that 93.6% of motorists are aware of the degree of environmental hazard and are ready to participate in the solution of the environmental problems of the coexistence of vehicles and urban areas. They are ready to obtain relevant knowledge and put it into practice.

### 4. Conclusion

The priorities are in the solution of the problem of “collision of cars and northern cities” in the greening of training in driving schools and in the formation of an urban environment as an element of the infrastructure of entrepreneurial activity and the development of the potential of parking business, both in the central regions and, especially, outside them, as the level of security car parking spaces in St. Petersburg ranges from 20 to 30%, and these numbers are all declining.

The incomes of population are growing slowly, car prices are growing significantly, so a sharp jump in the level of motorization is not expected. Therefore, it is necessary to create conditions to reduce the environmental hazard of existing cars. The parking business, together with the IT business, will help create parking comfort and help reduce the environmental hazard of vehicles in the northern cities of Russia.

Thus, the level of ecological culture of the surveyed car owners can not be underestimated, as a result of which environmental arguments can play a significant role in the achievement of the goals of transport policy.

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