Improving the Organization of Taxi Transportation System

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Abstract. The existing system of taxi transportation in the Russian Federation is arranged in such a way that the bulk of the traffic is carried out by so-called aggregators that provide information services to drivers and passengers while they are not carriers by themselves. Thus, most of the passengers are carried out by the drivers with no permission for this kind of activity, that has bad influence on the safety of passengers and road safety in general. Aggregators are increasingly forcing taxi companies out of the market. At the same time, the legal status, rules of activity and responsibility of aggregators are not defined by the current legislation.

This article presents the results of the research aimed at improving the existing system of taxi transportation in order to enhance its security.

1. Introduction

In Russia passenger taxi transportation volume makes up 6-9 percent of the total passenger traffic and depends on the size of settlement [1]. Taxi transportation has a number of advantages over other types of public transport, such as personality, flexibility, door-to-door transportation, high speed of vehicle delivery, etc.

A taxi market has been developing for about a hundred years in Russia. So-called taxi-aggregators had appeared on the taxi market ten years ago. Aggregators provide information services to drivers and passengers, but they are not carriers by themselves. Due to low tariffs, aggregators are in great demand. They carry out a large share of the taxi traffic total volume pushing traditional taxi companies out of the market. At the same time, their legal status, responsibility of aggregators, as well as requirements for them are not legally established.

Taxi transportation by cars has a number of problems associated with the work of aggregators, such as organizational, technological, personnel, legislative and economic. These problems together are the reasons for the low safety of taxi transportation.

2. The existing system of taxi transportation in the Russian Federation

Currently, there are two forms of taxi transportation in Russia, namely, taxi companies and so-called aggregators.

Taxi fleets are classic vehicle fleet operators which have their own or leased rolling stock (taxi cars), drivers working under an employment agreements, a dispatch service, a medical staff for conducting pre-trip and post-trip examinations of drivers, an inspector to check the vehicles technical condition, all the necessary equipment for technical inspection before vehicles being released on the road, etc. Thus, a taxi company is an independent organization that accepts transportation orders and
provides passengers carriage services at its own expense. It also bears full responsibility for its activities, including the safety of transportation.

Advancement in mobile communications, development and distribution of mobile applications simplify many aspects of life. Development of the information sphere has also affected taxi activities which is one of the reasons for taxi aggregators coming.

An aggregator is a company (legal entity or individual entrepreneur) that accepts and (or) transfers orders for transportation of passengers and luggage by passenger taxis on the basis of information dispatch services agreement with a carrier which is expected to have a permission for carrying out aforesaid activities on the territory of the country or corresponding subject of the Russian Federation [2]. Aggregators perform their activities using mobile applications or with help of dispatchers. The aggregator performs only a dispatch service, that is, it provides exclusively information services, while the transportation is performed either by a self-employed driver, by an individual entrepreneur, or by a taxi company. At the same time, aggregators position themselves as taxi companies, as we see the word “taxi” in the name.

Having contacted the aggregator and received necessary instructions, the driver acting as a carrier installs a special application on his mobile device (phone or tablet) and can immediately start working. As the driver is connected to the aggregator system, he pays a commission fee amounts from 10% to 30% per each order, depending on the location and driver's status, as well as a commission to the taxi company which makes up from 3% to 10%. Sometimes drivers also have to pay for withdrawing money from the application.

The existing system of taxi transportation is shown on the scheme below (Figure 1).

As we can see from the diagram, the cost of the trip is assigned by an aggregator, though it provides only an information service. In fact, the transportation is carried out by the driver, so it is a
driver who is responsible for ensuring the organization and safety requirements of the transportation process. The aggregator's requirements for carriers are extremely low. Thus, drivers neglect quality to earn money, as they cannot provide it within existing tariffs.

Drivers often have to cope with a taxi company in order to work through aggregators while conclusion an employment agreement with a taxi company is not a criterion. It happens sometimes that a driver carries out transportation in the Primorsky Territory, but cooperates with a taxi company in the Republic of Bashkortostan.

The challenge of responsibility distribution in case of performing a service by means of aggregators is extremely complex and is not legally regulated. Often a passenger calls a cab using a mobile application of the aggregator and the transportation is carried out in a car with the logo of this aggregator. But, in fact, the service is provided by the carrier who has bought information about the order from the aggregator. At the same time, in most cases a passenger believes that the service is provided by that very aggregator, and the aggregator is responsible for it.

Despite the complexity of interaction between the taxi market participants, namely aggregators and carriers, aggregators occupy an increasing market share due to the low cost of travel for passengers and a large number of orders for carriers.

3. Research based analysis of the problems relating to the taxi transportation in the Russian Federation
The results of studies carried out by the analytical center under the Government of the Russian Federation show that a great deal of the taxi market is in the shadow and the taxi drivers obtain no permission for the transportation of passengers. The volume of the illegal taxi market has increased by 25.7% in 2019 compared with 2017. At the same time, the popularity of taxi services is growing every year, especially in small towns [3, 4].

The analysis of scientific papers brings us to the conclusion that currently one of the main problems of taxi industry is poor transportation safety.

Thus, Professor N.O. Bludyan refers to tariffs of taxi aggregators as "dangerous" in his work [5]. The argument is justified by his calculations which prove that a taxi driver needs to work 15-17 hours per day in Moscow in order to achieve the average level of wages in the city (in concern of the most common "Economy" tariff). Long hours working leads to fatigue and reduces driver reliability. At the same time, it is a statutory requirement for the passenger taxi drivers to work no more than 8 hours a day [6].

Serbian researchers have also given a consideration to the issues of professional drivers’ fatigue and its impact on transportation safety [7]. In the course of their research, they concluded that more than a half of the drivers had not been sleeping the night before the accident. The authors also state that if drivers work beyond the acceptable limit, they are 3 times more likely to sleep less than 6 hours round-the-clock. Furthermore, if they sleep less than 6 hours, they are 8 times more likely to have poor sleep quality. Poor sleep quality reduces driver’s productivity and therefore increases the risk of accidents.

Dobrovolskaya A.A. [8] proposes to implement a system of short-term parking for taxi cars in the city of St. Petersburg, since such a system will improve safety by preventing the clustering of taxi cars in one place and decreasing the randomness of incoming requests from different parts of the city.

A number of works reflects the influence of aggregators on the taxi market. Panin D.A. [9] considers the factors contributing to administrative offense commitment in the field of passenger taxi transportation. One of the aforesaid factors is a function of taxi dispatch services (taxi aggregators). The author highlights such issues as lack of legal regulation of the activities of taxi dispatch service. In fact, they are engaged in illegal activity providing their services to entrepreneurs who a priory have no permission to carry out passenger transportation.

The article of Makharadze N.S and Demeshko V.D. [10] addresses the challenge of taxi enterprise insurance. They also bring attention to the problems associated with the activities of taxi aggregators and their negative impact on taxi transportation safety.
The authors of works [11, 12, 13, 14] consider the features of taxi industry legal regulation. In their opinion the main problem which is to cause the other issues is the insufficient legal regulation of taxi aggregators activities. Based on the analysis of the developed countries experience, Bludyan N.O. [12] believes that a parallel market for the transportation of people by cars without permits is being created, i.e. there is being formed a new class of drivers to whom the application of many regulatory legal acts is impossible.

Thus, the analysis of scientific works allows us to conclude that the existing system of taxi transportation does not make it possible to ensure high quality, and above all the proper level of safety of the transportation process.

4. Taxi transportation safety

In 2019, due to the car drivers having a license (permit) for transportation activities there have occurred 2,748 road accidents with 105 people died and 3,530 people injured in Russia. These figures are higher by 28.8%, 11.7% and 30.2% respectively in comparison with 2018 [15].

Information about road accidents involving taxi cars often appears in the news media. Despite most of them have no victims, their large amount points to low qualification of taxi drivers. According to some reports, the frequency of accidents among taxi drivers is 6-7 times higher than among ordinary drivers [16].

The following characteristics of passenger transportation by cars cause its poor safety:

- Taxi is popular, most people use road transport every day;
- Taxi works round-the-clock;
- Taxi travel is comparatively cheap;
- Taxi can bring you from starting point to final point and you don’t have to use other types of transport;

Due to the low cost of service and high commission of aggregators, drivers are forced to work overtime, that leads to their fatigue and causes high risk of accidents.

Passengers can not only be injured in road accidents, but also become victims of rape, murder, and robbery. Just in a single 2018, news media had reported about 12 rapes, including three children, and one attempted rape with robbery. However, there are suggestions that these are not all cases, as many victims do not contact the police.

All above mentioned confirms that the problems associated with the safety of taxi services are due to the presence of aggregators on the market. Transportation using aggregators’ services is carried out without observing the following statutory safety requirements:

- the drivers do not attend pre-trip and post-trip medical examinations;
- the vehicles do not have technical check-up;
- there is no travel documentation;
- the drivers’ work and rest schedule is not kept;
- no training and coaching to be provided to drivers;
- transport security requirements are neglected (there are no guarded parking space for vehicles).

Aggregators have been operating on the Russian market for over 10 years, but the legal status, rules of activity and responsibility still have not been defined by the current legislation.

There have been making some attempts to solve problems at the federal level. The Legislative Assembly of the Russian Federation has been developing the draft of “Taxi Law” for several years, but the law has not been adopted yet. The draft of “Taxi Law” is a slight supplement to the Federal Law No. 69, but they still do not fully regulate the activities of aggregators [12, 17].

At the same time, aggregators are a direct threat not only to the taxi passenger’s safety, but also road traffic in general. In this regard, there is a need to create a new system for organizing passenger transportation by taxi cars, based on clear legal statutory of the activities of all participants defining their rights and obligations, as well as requirements for ensuring the safety of transportation.
5. Proposals for improvement of the taxi transportation system in the Russian Federation

As a new system we suggest to revive a mass of taxi fleet companies and develop a clear scheme for their interaction with aggregators (Figure 2).

![Diagram of improved taxi transportation system]

**Figure 2.** The scheme of improved system of taxi transportation organization.

According to the proposed system, only taxi companies can be a carrier, as they have the ability to fulfill the requirements for organizing and ensuring the safety of the transportation process.

The aggregator is also participating in the transportation process by providing information services to carriers, but now it does not set tariffs.

In the proposed system of organizing taxi transportation, the transportation process is carried out by taxi companies, in this regard, they must set tariffs.

Passengers ordering a taxi by means of aggregator will be informed who will be a carrier (taxi company), there will be a clear understanding which company is carrying out the transportation and bears responsibility.

In addition to information services the aggregator will perform control functions. To perform these functions, it will be necessary to refine the software products of the aggregators. The objective of the program will be the admission of drivers and vehicles to the transportation. Drivers who have passed the pre-trip and periodic medical examination and have the documents prescribed by law are allowed to release on the road [18, 19, 20]. Vehicles are allowed to release on the road after checking the technical condition. The employees responsible for the release of drivers and vehicles on the road ensure the compliance by using marks in program. Thus, drivers will be able to access the ordering system only if they have all the marks.

The work of self-employed drivers should be excluded, because they cannot meet all the requirements for organizing passenger transportation, and, as a result, safety conditions. The new
system implies the drivers to be hired according to the labor legislation of the Russian Federation with all social guarantees and remuneration for work performed. There is also a need to exclude the operation of cars that are in the personal use of drivers or rented by them, as the drivers cannot provide the necessary maintenance of vehicles in accordance with the requirements of law. Taxi cars are supposed to be used and maintained by taxi companies. Moreover, it is necessary to revise the process of getting permission. The issuance of permits can be carried out in conjunction with the annual technical inspection of vehicles and be valid for a period of 1 year. In order to ensure a high-quality technical inspection of taxi cars, it is advisable to assign it to the department of technical supervision and registration of motor vehicles of the State Traffic Safety Inspectorate.

It is reasonable to create a register of taxi drivers and cars. The implementation of a state register of taxi drivers will eliminate the work of drivers with several taxi companies. To reduce the level of accidents in future it is advisable to create a database with the personal files of drivers, containing their faults, absence or presence of criminal records, rating, etc. The register of cars will contain information about the permits received, the technical inspections passed, information about road accidents and damages received in them, the valid Compulsory Motor Third-Party Liability Insurance.

The proposed system of organizing taxi transportation is impossible without legislative regulation. In this regard, it is necessary to develop and adopt a federal law covering the operation of passenger taxis and taxi ordering services, where should be fixed the concepts of "taxi company", "passenger taxi driver" and "taxi ordering service". In addition, it should contain the recommendations on the minimum cost of a kilometer and aggregator commission fee. The new law is supposed to accumulate all the requirements for the industry, and supplement them with regard to above mentioned issues.

6. Conclusions
In conclusion, it should be noted that aggregators have taken the passenger taxi market due to the convenience of calling and low cost of travel. Taxi fleets cannot compete with aggregators and have a number of disadvantages in comparison with travel booking services. They are as follows:

- Expensive cost for travelling;
- Long time waiting for a car;
- Long time needed for ordering a taxi;

A new form of interaction between taxi companies and aggregators can make it possible to improve the situation in general. It allows:

- To cut down the taxi fleet tariffs due to the minimizing of empty running and growth of customer base;
- To reduce the time of car waiting due to the algorithm of order distribution by aggregators;
- To make the taxi car ordering more convenient from the mobile devises;
- To improve the quality of travelling, as the carriers will be a taxi companies, which have all the necessary resources to ensure the transportation process;
- To make the transportation more safety, reduce the accident risks, since the drivers and vehicles are prepared better for the process;

Thus, the changes proposed in this work can become the basis for the developing of a new system of taxi transportation in the Russian Federation.

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