

The Impact Of The Taxi Service Mobile Applications On The Financial Condition Of Taxi Companies

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Abstract: The article considers the impact of using taxi order mobile applications on the financial condition and activities of the entire industry. The study conducted a comparative analysis of the activities being carried out by the largest taxi mobile applications: Yandex Taxi and Uber as well as companies providing taxi transportation. The data obtained from the performed analysis formed the basis of some conclusions. In particular, some problems encountered during the activities of taxi companies were identified: a constant price reduction that displace competitors from the market, the reduction of service quality in the companies providing services via the taxi order mobile applications, and the reduction of income in companies using traditional taxi services. The Results showed that the increase in the companies' revenue generated by providing services of mobile taxi applications rising above 1000 million rubles led to a drop in the revenue of taxi companies that use traditional forms of activity. So, the main directions of the market's development connected with the provision of passenger transportation services by means of a car taxi are offered. For this purpose, there is need to integrate modern ways of doing business into the routine activities of the enterprises that are engaged in taxi transportation.

Index Terms: taxi, passenger taxi transport, taxi transportation, taxi order, dispatching service, mobile services, online ordering service.

1 INTRODUCTION

Innovations are becoming more widespread in the world of transport, as the level of passenger's service quality is now being defined [1]. Digital transport or intelligent transport systems (ITS), is becoming increasingly common in various countries around the world [2]. The centers for ITS development are the USA, Japan, and the European Union. Germany is a driver in the development of information systems in transport sphere in Europe. In this country, the concept of digital transport is considered an element of the fourth industrial revolution, placing high demands on the systems of transmission, identification, processing and storage of data [3]. The emergence and development of digital intelligent technologies is an absolute achievement of mankind. The use of information and telecommunications in human life has changed the quality of life as well as increased the efficiency of resource use, and has stimulated the development of environmental safety [4]. At the same time, the development of information resources has led to a change in the clientage degree of awareness about the possibilities of choice: services, supplier, service options, etc. There is no exception for the transport industry, which work directly with citizens and large companies. Modern technologies impose strict requirements to transport and export companies, forcing them to modify their offer and to adapt to market conditions [5]. Currently, in the global economy, there is such situation whereby: companies and business models use traditional ways of doing business and after successfully developing in the market for a long time, suddenly become uncompetitive and suffer losses. This trend is most clearly observed in the passenger taxi market.

According to available research and publications in foreign sources of information, the emergence of companies offering mobile applications for a taxi calling, which almost instantly assist in finding a suitable carrier for passengers (taxi aggregator companies), has led to a growth in the income of companies operating "the old-fashioned way", i.e. using the traditional business model. The reviewed research focuses on the impact of taxi aggregator companies on the traditional passenger taxi service sector. At the same time, such aggregator companies are also mentioned in connection with the fourth industrial revolution. However, open sources of information have practically no research that studies the financial indicators of the influence of aggregator companies on the activities of traditional taxi companies. Therefore, the research, which would study the impact of companies offering mobile services for taxi calling on the financial performance of companies using the traditional business model in the market of passenger taxi, will enable a clear identification of such a relationship, in order to draw the appropriate conclusions. Thus, the purpose of this paper is to study the impact of the use of taxi's service mobile applications on the financial performance of taxi companies. To assess the impact of the emergence of mobile applications on the taxi market of traditional passengers, a systematic approach is used which makes it possible to consider the passenger taxi market as a set of interrelated and interdependent elements. Also, comparative analysis, as well as economic and statistical methods of analysis were used.

2 LITERATURE REVIEW

The thing that has turned into taxi and taxpayer conflicts with Snap and Therapy in the past weeks has been to make the vote less popular and more satisfying to the public at large, now that these two transit apps are priorities for inland city travel. A contradiction that may have to take people's opinion of the degree of satisfaction and dissatisfaction from both sides of the story as a complete factor in judging. The same bumpy route was similar in the past to Uber, Lift and Internet taxis and apps [3]. In 2009, there was a tremendous transformation in the public transportation system. The origin of this change was California in the United States. The new

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idea, which was made by Garrett Kamp to a revolutionary plan, soon began with the support and partnership of the Trinity Clinic as an investor, a road that could be described as a huge change in the transportation system. Uber entered the job market. Entry did not compete with the market, but with monopoly power. With the introduction of the Uber app to the California shipping industry, what happened was that Uber seized 70 percent of California's daily traffic. Normal city taxis had no choice but to lower their rates so that they could break this monopoly and compete with space. Something that certainly did not fit their taste, and later sparked protests that the flames of that day were wider [8]. Uber is actually an application that allows the customer to use the Internet for their city trips in the form of a shipping service. The process is very fast, and the passenger can use the app to get the car, driver, and exact location of the vehicle, and thus experience a safer, and less expensive, journey [6]. While Uber experienced international growth, deep and serious disagreements with town tax systems and, of course, the governments of the countries where Uber had come to them. In April 2014, Uber's activities in the city of Berlin were banned by the government, although the system continued to grow vigorously in other German cities. However, the popularly welcomed Uber will continue to suspend Uber in Berlin, and it seems that the case is still not closed [9]. On June 11, 2014, urban taxi drivers, cities in Berlin, London, Paris, and Madrid launched massive protests against Uber and announced the presence of this system in urban transport as a result of the slump in their business. However, although in Berlin the Uber has stopped, and of course this is still a controversial issue in the legal circles of the city, other cities did not succeed in removing Uber's Internet service tax from the public transportation system. However, the controversy continued, and the opposition became more intense as Uber became the Internet giant in the world [7, 8]. Opposition to Uber is not simply about the massive protests of taxi drivers in several of the world's big cities. The floods of government opposition and taxi companies with Uber are entering a new phase with legal action [5]. State and nonprofit protesters are defending competition with this transportation system in an unfair environment by claiming that they do not pay taxes or licensing fees. Failure to pay licensing fees or taxes from Uber Oprahs will have a direct bearing on endangering passengers, non-trained drivers, and consequently lacking licenses and insurance. These lawsuits, but sometimes also complain about Uber drivers, that although they are employees of the system, they do not have legal and legal privileges in accordance with the rules of employment. Similarly, Uber sees many problems in his ever-increasing pace that unconsciously makes this way uncomplicated [6]. However, the wave of protests against Uber intensified in the middle of 2015. Spain, Colombia, Italy, France, Denmark, Canada, China, and the United Kingdom, and some other countries, launched many protests against Uber, which, as a result of them, and of course disagreements with some government officials, prohibited Uber in Spain and two Indian cities Became Though a year later, Uber returned to the streets of Madrid, with newer rules and more restrictions, although the rigorous handling of this Internet service increased in this return. At the same time, the dispute with the governments of India, the United States and Australia went even further. The analysis of foreign sources of literature showed that the emergence of mobile applications for taxi calling, as well as applications that allow you to use your own

cars in the field of passenger transportation by taxi, significantly affected the market [6,7,8,9,10, 11, 12, 13, 14, 15]. The main impact of this is associated with the reduction in transaction costs, which allows companies using mobile taxi applications to reduce prices compared with long-standing taxi companies on the market [7]. At the same time, due to the existing economic conditions, credit institutions or financial companies are extremely reluctant to grant loans to enterprises providing passenger taxi services [1].

3 THE BASIC THEORETICAL POSITIONS

The introduction of Industry 4.0 has far-reaching implications in the creation of industrial value. Research on existing opportunities and challenges encountered by companies is still scarce. Nevertheless, the high practical and theoretical relevance of digital and related production technologies imply the need to understand the basic dynamics of their implementation [34].

3.1 The Definition of Industry 4.0

The concept of the fourth industrial revolution (Industry 4.0) was first formulated as the introduction of cyber physical systems in factory processes (Hanover, 2011). It is assumed that these systems will be combined into one network, as they will communicate with each other in real time, they will be self-adjusting and can learn new behaviors. Such networks will be able to boost production with fewer errors, interact with the produced goods and, if necessary, adapt to the new demands of consumers [21]. Definition [33]: "Industry 4.0" provides the end-to-end digitization of all physical assets and their integration into the digital ecosystem with partners in the value chain [22]. Digitalization of the industry is done through the integration of sensors in the components of products and production equipment as well as through the use of cyber physical systems and data analysis [23;24]. Transformation of production is based on advanced technologies and it involves the connection into a single system of sensors, equipment, products and it-systems along the value chain both within one enterprise and beyond it. [25, p.2-4]. The key postulates of Industry 4.0 are the integration of physical elements of production and it -systems for the development and use of cyber physical systems for production [26]. Interconnection of information and communication technologies and production systems [27]. The industrial revolution is based on cyber physical production systems (CPPS), through which physical and virtual worlds are connected [29, p. 3-9]. Integration of all value-creating units and other elements of the enterprise is achieved through digitalization. Information and communication technologies and automated production technologies are fully integrated in the plant of the future. All subsystems, including non-production within the enterprise, as well as external partners, suppliers, original equipment manufacturers (OEM) and consumers are connected and consolidated into a single system [29] The technological evolution involves the transition from embedded systems to cyber physical systems. There is a Paradigm shift from centralized to decentralized production. There is also an interaction between the real and virtual worlds. Connection exists between built-in production systems and "smart" production processes [30. p.8-10]. A new level of organization and control of the entire value chain and product life cycle is aimed at personalizing and taking into account the individual requirements of consumers. The basis of Industry 4.0 is to

enable access to all relevant information in real time by connecting all elements in the value chain [31]. The transition to fully automated digital production, managed by intelligent systems in real time, having constant interaction with the external environment, going beyond the boundaries of one enterprise, with the prospect of combining all into a global, industrial network of things and services [32].

3.2 The Theoretical Positions Of Passenger Taxis

There are three segments in the traditional market of passenger taxis: taxis waiting for passengers in the parking lot; dispatching taxis; cruise taxis [8]. The first segment involves the taxi waiting for passengers at the designated parking lot. In this segment, the customer service is as follows: taxis line up and passengers take the first taxi in this queue. In the second segment, customers order a taxi by phone with the dispatcher, who also informs the customer about the arrival of a taxi by phone call. In the third segment, passengers stop a taxi right on the street, which is the most unfavorable option for companies in the case of revenue planning, waiting time and quality of service. In this case, the companies with the largest number of taxi cars were the most competitive in the market of passenger taxi services, which led to a reduction in the waiting time of customers. At the same time, all three segments of the passenger taxi market were characterized by the fact that companies providing passenger transportation services by passenger taxis, owned or rented cars used by the company's employees. The emergence of mobile applications has affected the market of passenger taxis on both sides:

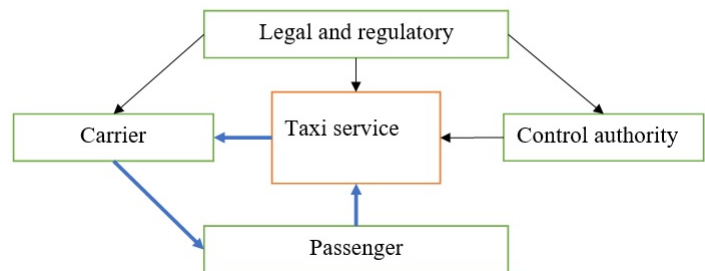
- 1) on the passenger side;
- 2) on the carrier.

In the first case, the passenger has the opportunity to quickly order for a taxi, while not standing in queues. The passenger does not need to catch it on the street and do not get through to the dispatcher. This has led to the quality improvement of taxi service, as well as to the passenger's satisfaction due to the speed of service. In the second case, mobile applications have led to the emergence of a new type of enterprises, which provide passenger taxi services. Some western experts in this field believe that mobile applications that are used in the market of passenger taxi services are new market participants that produce a radical change in this market. They stimulate the destruction of existing monopolistic structures in order to increase the potential of the market, its efficiency and productivity by improving consumer benefits and functionality, reducing costs, reducing prices and investments, while increasing the impact and other social and environmental benefits (reducing congestion, emissions of automobile gases, etc.) [7]. As a rule, companies that provide mobile applications for ordering a taxi do not have their own fleet and provide information services only, connecting the vehicle owners with potential passengers in the market, i.e. the so-called "sharing services" [12]. Sharing service trips make vehicles that otherwise would have remained unused, to be used as a taxi on demand. Of course, the use of cars also leads to the consumption of resources. In the case of non-usage of the car, there is a decrease in its cost due to depreciation. When using such cars as a passenger taxi, there are additional costs associated with fuel and current costs arising during the waiting period of the passenger. Also, there is a question of alternative cost of the driver's work,

which he could receive in the main place of work. However, it is believed here that the work is carried out in his spare time, i.e., there are minimum alternative costs [7]. Now, the successful activity of taxi companies is associated with the presence of a special link in the "carrier – passenger" system, which accepts orders for the transportation of passengers [35]. If the functions of the taxi service were earlier performed by the internal division of such companies — the dispatching service, now modern technologies — mobile applications are increasingly developing (figure 1).

Figure 1

The model for organizing the transportation of passengers by automobile taxi



The order service plays an important role in the new business model of passenger taxis. This service is transformed, becomes automated and contributes to the optimization of taxi operation by enabling faster interaction of carriers and passengers in this market.

3.3 The Activities Of the Companies Using Mobile Applications For Taxi in Foreign Countries

The American company Uber is a pioneer user of mobile applications for passenger taxi services. The company was established in 2009 and by mid-2014, it already had eight million users and 160 thousand drivers in 250 cities of fifty countries. Its cost was estimated at \$ 40 billion [7]. One of the reasons for this rapid success, which began in the United States was the ability to use such mobile applications to bypass artificial barriers established by the regulatory system in this market. Uber does not have its own taxi fleet; however, it controls the basic functions of booking, fare setting, payment and brand communication with minimal staff. Uber's role is to match the user and passenger to verified Uber drivers who make transactions directly via Uber. In this case, the role of the mobile app firm is to provide essential features that allow passengers and taxi operators to interact with each other in the following ways:

- the search and availability,
- the booking,
- the tracking,
- the payment.

In addition, Uber provides quality control of the provision of these services through:

- the selection and verification of participating drivers,
- the rating of drivers and passengers,
- the common performance standards,
- the presence of the brand,
- the communications.

The mobile application taxi allows the passenger to create an account, to estimate the waiting time of the car, as well as to pay for trips with the help of non-cash transfers. The advantage of using mobile taxi applications is that the passenger can track the situation with the arrival of the ordered car online. Drivers can stimulate their activities in the hours of greatest demand by using mobile applications. In general, the use of mobile taxi services provides the following benefits for users:

- Firstly, the software is extremely easy to use and gives the user a clear idea of where the car they just hired is. It gives one the ability to track its movement on the screen of their mobile devices. This reduces customer anxiety when waiting for a taxi;
- Secondly, compared with conventional taxi services, the prices for such services are usually more attractive;
- thirdly, users do not need to have cash or cards, as all transactions are carried out electronically;
- Fourthly, it is possible to evaluate your driver, which motivates him to provide better services to improve the rating. Because of its appeal to both passengers and drivers, Uber's entry into the market tends to be accompanied by a reduction in the number of orders received by other taxi companies and therefore, it leads to a reduction in revenue.

For example, in New York, such restrictions led to the license amount being over \$ 1 million in 2013. By 2015, mobile taxi services became active, thus, the price of one permit fell by about 25 % in response to competition from travel-sharing services. This led to the activation of regulatory authorities in the United States which were approached by traditional taxi companies, this limited the services of Uber in some states [7].

The same scenario was experienced in the European Union — the penetration of Uber into the European market and the emergence of similar companies led to protests by local companies providing passenger taxi services. Also, in a number of European countries (Denmark, Bulgaria, Greece), it led to the prohibition of mobile taxi services. Uber started operating in the Turkey's market in 2014. At the same time, the company's activities were limited only to the passenger taxi market in Istanbul. However, in mid-2018, Turkish President Recep Erdogan officially announced the ban on the activities of Uber in the country, in order to support the growth of the local taxi companies [10].

4 RESULTS AND DISCUSSIONS

The accounting data of the largest companies operating in the passenger market with the help of passenger taxis in Moscow and the Moscow region were used to study the impact of companies offering a mobile application taxi service or the so-called taxi aggregators. The volume of passenger transportation by passenger taxi increases from year to year currently in the Russian Federation, but its value in the total volume of urban passenger traffic remains small — up to 1% [35]. Uber began operation in Russia in November 2013. First, it started in Moscow and St. Petersburg, and then in 2015, it began to open offices in other Russian cities, which caused a significant increase in revenue from the Russian division of the company. At the same time, it should be noted that another company, "Yandex Taxi" — aggregator of passenger taxi services, rapidly increased its revenues in Russia— (table 1,

Fig.2). In 2018, the two largest taxi aggregators in the Russian market (Uber and Yandex.Taxi) were merged. This fact will have an impact on the transport market in Russia in the future. Thus, there is a similar trend in the Russian market as in the American and European markets: the revenue of companies occupying the largest market share among mobile taxi applications is growing.

TABLE 1

DYNAMICS OF REVENUE OF THE LARGEST TAXI AGGREGATORS IN RUSSIA

Company name	2013	2014	2015	2016	2017
Uber Technologies, Inc.	43,2	113,7	92,6	72	99,8
Yandex.Taxi PLLC	-	-	149,2	2823,2	9024,8
Total revenue, mln. rub	43,2	113,7	241,8	2895,2	9124,6

Figure 2

Dynamics of revenue of the largest taxi aggregators in Russia

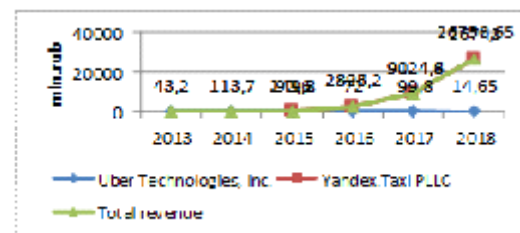


TABLE 2

DYNAMICS OF REVENUE FROM THE PROVISION OF TAXI COMPANIES

Company name	Characteristic	Revenue, mln rub.				
		2013	2014	2015	2016	2017
Limited liability company "ASAP Transportati on company» ¹	Traditional business practices	255	1354	300 2	134 0	826
JSC "Moscow Taxi» ²	Traditional business practices	160	346	545	340	169
Limited liability company "Formula Taxi» ²	It has a call-center, you can order a taxi through the Internet site	89	98	105	142	184
Total revenue of Moscow taxi companies ³		504	1798	365 2	182 2	117 9

¹Economic activities of ASAP LOGISTICS LLC (OGRN 1157847326603 TIN 7810382953), https://ogrn.site/companies/1253086-ooo_asap_logistika/activity/, 2019

²JSC "TAXI MOSCOW", <https://qinform.ru/company/ao-taksi-moskva-1127746466341, 2019>

³ Limited liability company "Formula Taxi» , <https://sbis.ru/contragents/7726596932/772601001, 2019>

To assess the impact of these taxi aggregators on the activities of taxi companies, the income of some of the largest companies providing passenger taxi services in Moscow were considered (table 2).

Theoretical and practical results of research

In order to determine the relationship between the activities in the Russian market of companies providing mobile taxi applications (taxi aggregators) and the activities of taxi companies operating in the passenger taxi market, consider the total revenues of the main subjects of this market. After the total revenue of taxi aggregators exceeded 1 billion roubles, there was a decrease in revenue from taxi companies that use traditional forms of activity.

5 DISCUSSIONS

The rapid development of science and technology, especially in the field of the latest computer programs and electronic information technologies, their total introduction into everyday life, globalization processes in the world contribute to the change of traditional services. For example, the introduction of the possibility of making electronic transactions (including through the use of web services, mobile applications, etc.) has led to the development of taxi aggregators. Their actions have significantly changed the market for passenger transport services. But at the same time there is a tendency to decrease the efficiency of the existing taxi companies. This is very important for modern transport business. Due to the active development of mobile applications and taxi aggregator companies, the usual taxi company, which works on calls of clients and is oriented to the provision of passenger transport services according to old schemes, is almost gone. Entrepreneurs should think about reorienting their business to new service models. Thus, taxi companies need to develop their own applications for smartphones, which facilitate taxi ordering and control of transaction by the user. This allows to significantly increase customer satisfaction with taxi service. Entrepreneurs should also pay attention to the futility of large investments in the development of taxi companies operating under the old, non-digital scheme of customer service. For researchers from scientific organizations, interesting conclusions are also present in the work. Thus, consumers who use websites and mobile applications (such as Uber, Yandex. Taxi and BlaBlaCar) to order individual transportation do not generally realize what they are dealing with and who they are dealing with - the carrier, the intermediary, the information and reference service or service, the information and control service, or the entity that provides information and control services for the carrier and the passenger. This has significant legal and economic implications both for individual companies operating in the passenger transport market and for the market as a whole. Thus, in the market as a whole there is a redistribution of shares and a re-segmentation of the market. This situation is interesting from the point of view of theoretical economic research - both from the point of view of the theory of civil legislation, which requires certainty and clarity in the regulation of passenger transport by new market participants, and from the point of view of the theory of economics, which demonstrates new trends within the framework of economic laws of the market.

6 CONCLUSION

The development of mobile taxi aggregators' market began

quite recently, so the results of the study on the impact of taxi aggregators on the financial performance of enterprises providing passenger taxi services, is the first attempt to summarize information on the transformation of the business model in this market and finding the relationship between the activities of companies in the new formation and the activities of companies in the old formation. However, the following conclusions can be drawn from the results of the present study. The companies provide mobile taxi services, in fact, form a new segment of the market of passenger taxis, where there is an interaction of drivers offering trips and passengers who book a trip in a taxi through the mobile application. An assessment of the impact of companies using mobile services in the market of passenger taxis, showed that from the market position such activities are more effective, but it shows at the same time, a reduced income of other companies providing services in this market.

Therefore, there are two options for the use of mobile services in the market of passenger taxis:

1-to counteract the entry into the market of companies using mobile taxi applications, which will deprive users of attractive services and cause long-term litigation;

2-to adopt technological changes and allow companies providing information services in the passenger taxi market to compete on equal terms with taxi companies. In our opinion, the most optimal is the option of development when companies providing information services in the market of passenger taxis interact with taxi companies that own a car park. Such a joint activity of taxi aggregators and taxi companies will generate income for both modern and traditional businesses in the market of passenger taxi services. The research presented in this article can be supplemented, firstly, by expanding the information base both in geographical coverage, including other regions of the Russian Federation, and in composition, adding information about the activities of other companies-offering mobile applications, for example, taxi "Maxim", taxi "Vezet" or BlaBlaCar, and companies doing the traditional business. Secondly, it is possible to analyze not only the revenue indicators, but also the financial results of taxi companies, as well as indicators of financial condition (liquidity, solvency, business activity). This will make it possible to fully and clearly identify the factors affecting the financial condition of taxi companies, as well as their impact on the performance of such companies.

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