

Factors Affecting the Demand for the Taxi – Evidence from Zhejiang, China

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ABSTRACT

The purposes of the study are to provide an up-to-date report about the three factors that affect the demand for the taxi regarding the rise of the new online transport companies, to figure out how the three selected factors affect the demand for the taxi and to offer recommendations to the taxi industry for attracting more consumers and gaining or at least holding its market share under fierce competitions with online transport companies. The dependent variable is the demand for the taxi. The independent variables are the three selected factors: 1) the release of taxi-booking app; 2) drivers' concentration level of driving; 3) the taxi company's good social purpose. The results based on the data collected from Zhejiang show that all of three factors have impacts on the demand for taxi in different ways.

Keywords: Taxi app, Drivers' concentration level, Good social purpose, Taxi demand

1. INTRODUCTION

The taxi industry is really an important part of cities' transportation. With the development of economy and the increase of people's life quality, the taxi has been more and more popular due to its convenience and comfort, He, Li and Jia. (2009). However, in recent years, the taxi industry has been blamed a lot. Relying on the taxi industry's longstanding monopoly advantage, many taxi drivers dare to refuse consumers to take their cars or even to go on a strike. It becomes unsurprising to hear negative news about taxi drivers or taxi companies. Also, many consumers complain that taxi drivers charge unreasonably and some drivers even trick passengers. Due to the barely satisfactory industry situation and the revolution of internet, many online transport companies such as Uber and DiDi appear to supplement the market in early 2014. Since then, people do not need to worry that they cannot catch a taxi or are refused by taxi drivers, Chinanews.com. (2015). What is good is that most of these

online companies provide people with extremely low prices. Some online transport companies almost offer free services to consumers who book cars through their applications for the first time. Moreover, some types of cars operated by those online transport companies have higher quality than the taxi and offer better service experiences to customers. In addition, DiDi Company comes up with the slogan related with commonweal, which is used as a strategy to avoid governments' monitoring as well as to attract consumers. As a result, consumers get benefits from the war between taxi companies and online transportation companies. When traditional taxi industry loses large market share due to such fierce competition, online transport companies gain more market share, Chinabgao.com. (2015). Therefore, here comes a question: how taxi industry can gain its market share back again.

In this study, we mainly focus on Zhejiang, which is an abundant and rich province in China. Both traditional taxi industry and online transport industry are quite flourishing. With enough supply of cars, people here look for more than prices that transportation charges but also consumer services that transportation offers. As far as we concerned, there are many factors having impacts on people's demand for transportation. Regarding the current situation, this research project plans to find out what new factors affect the demand for the taxi and to analyze how those factors affect the demand. The report also aims to give some suggestions to the taxi industry to help it gain or at least hold its market share in Zhejiang.

2. LITERATURE REVIEW

A preliminary literature shows that past studies were primarily focused on finding out basic factors, such as city level, price of the taxi, the population of a city and the infrastructure of a city, which affected the demand for the taxi. Very few studies tried to figure out how those factors affected the demand for the taxi. Moreover, even if some researches pointed out some factors would affect the demand for the public transport and figured out what the relationship between those factors and the demand for the public transport was, the studies did not specifically target on the taxi. Overall, some studies in China found out some basic factors affecting the demand for the taxi but did not analyze the relationships between them deeply. While some foreign studies found both factors and the relationship between factors and the demand for the public transport or taxi, few researchers did so in China.

A paper tried to figure out the nature of demand-supply equilibrium in a regulated market by setting up a network model. Factors such as road network or consumer origin-destination were considered in the research. The paper was more helpful for the national government to control the market and establish or revise

regulations and policies, Yang, Wong and Wong. (2002). There were also some studies pointing out that factors affecting the consumption of transport could be divided into three categories – demographic, geographic and economic factors. Most papers argued that the prices were the direct factors, which included monetary costs, travel time, discomfort and risk. The changes of price influenced the consumption of transport a lot. From the results of those studies, the demand for transport decreased gradually as the prices went up, Litman. (2004). Douglas even provided a basic model to show optimal levels of taxi prices and service quality, Douglas. (1972). Also, several researchers together analyzed how car ownership, land use, population, employment and wider transport policies affected the demand for public transport in the Britain. They planned to produce a document to assist cost-effective schemes for improving public transport services, Balcombe, Mackett, Paulley, Preston, Titheridge, and Wardman. (2005). In China, there were also some authors investigating factors that stimulated the travel demand, such as the emergence of labor and housing markets, urban reconfiguration and growth of family, which indirectly influenced the demand for public transport, Shen. (1997). Directly, He, Li and Jia argued that the development of society, urban natural conditions and urbanization level had effects on taxi passengers' demand for the taxi. They concluded the demand would increase dramatically if society in China developed better, urban natural conditions were more friendly for taxi to run and the urbanization level rose up. Like previous papers, they also pointed out that the demand increased as the personal income increased but decreased as the taxi price increased, He, Li and Jia. (2009).

From the literature review, very few papers investigated new factors that might affect the demand for the taxi under new competitions. Therefore, the long-term goal for this study is to create a document for taxi companies to improve their services from new aspects, competing against online transport companies. The study can also benefit the consumers who take the taxi.

3. HYPOTHESIS

In this paper, three factors are thought to have correlations with the demand for the taxi and the hypotheses are listed as:

- 3.1 The release of taxi-booking app exclusively used by the taxi industry affects the demand for the taxi.
- 3.2 The drivers' concentration level when they are driving affects the demand for the taxi.
- 3.3 The taxi company's good social purpose affects the demand for the taxi.

The further hypotheses can be drew as:

3.4 The release of taxi-booking app exclusively used by the taxi industry will increase the demand for the taxi.

3.5 The higher the drivers' concentration level, the higher the demand for the taxi.

3.6 Company's good social purpose will stimulate the demand for the taxi.

4. DATA AND RESEARCH METHODOLOGY

The objectives of this study are to figure out the relationship between the three selected factors and the demand for the taxi, and to provide pragmatic solutions to the taxi industry. The primary research methods used for this study are literature review, survey, qualitative and quantitative data analysis. The dependent variable is the demand for the taxi and the independent variables are the three selected factors as 1) the release of taxi-booking app; 2) drivers' concentration level of driving; 3) taxi company's good social purpose.

4.1 Data collecting procedure

Within this research, primary and secondary data were gathered from questionnaires and online database respectively. The questionnaires were distributed randomly both online and off-line among the citizens from Zhejiang province in May 2016 and were conducted over two weeks. All the responses were submitted anonymously and the information was permitted by the respondents for the research use. The questionnaire contains three factors mentioned early that affect the demand for the taxi. The information from the online database is ultimately used to testify the deviation of the samples chosen and to make comparisons with information shown from the samples. On the other hand, the secondary statistics are used as a supplement information to complete the research.

4.2 Instrumentation

In the questionnaire, the questions are designed as yes/no questions, multiple choices and ranking questions. Yes/no questions are used to test whether the selected factors have influences on the customers' demand for the taxi and to screen out the target participants to answer the further questions. Multiple choices questions are designed to figure out how the factors affect the demand for the taxi and to what extent the factors influence the demand. To assess what factors make a car booking app most attractive, a four-point scale ranking question ranging from "most important" to "least important" is used. In addition, the questionnaire opens with a demographic item – gender to clarify the sample size and the composition.

4.3 Sample size

The questionnaires were answered by 400 participants, and all the participants were selected randomly both on the internet and on the street. There are totally 250 females and 150 males, which make up 62.5% and 37.5% of the informants respectively.

4.4 Results

We start with a question asking “will you choose taxi when you need a car” to screen out the effective informants for the further questions. The statistic shows that within 400 participants, 80% of them are willing to choose taxi when they need vehicles, while 20% participants show negative attitudes toward taxi. This result hints that the taxi industry still has competitive advantages even though various online transport companies are developing rapidly. The information also infers that reorganizing the taxi industry is necessary under new market situation.

4.4.1 Findings of the release of taxi-booking app

In this following three questions, we study the effects of the app exclusively used by the taxi industry.

Figure 1: Will the release of a new app exclusively used by taxi industry influence you on choosing taxi?

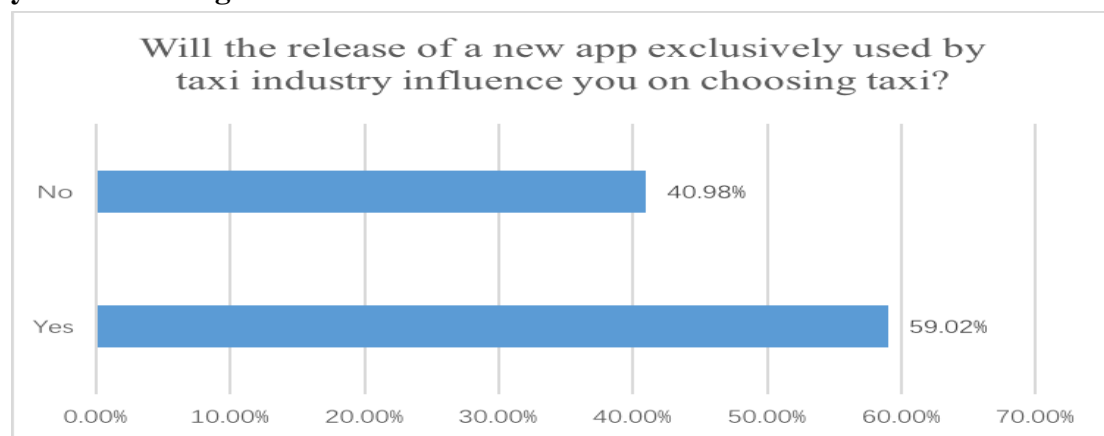


Figure 2: If the taxi company releases a new app that allows you to order taxi, will you choose taxi more when you need a car?

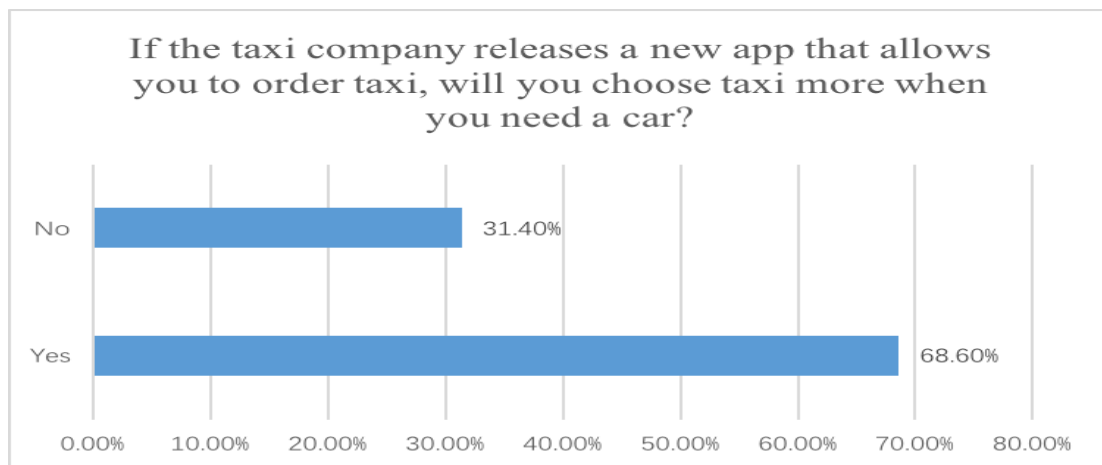
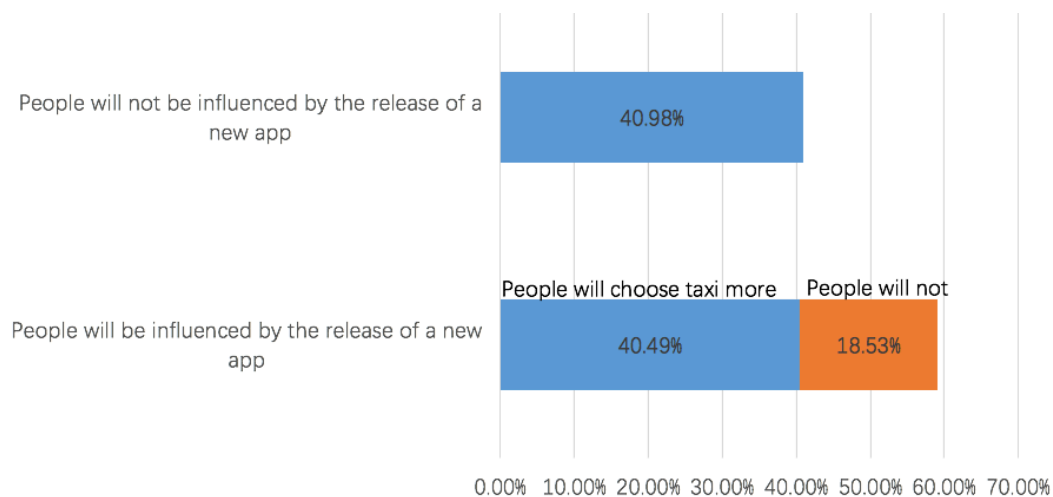


Figure 3: The specific percentage of people who will be influenced by the release of a new app and choose taxi more or will not if taxi companies release new apps shows in the whole sample.

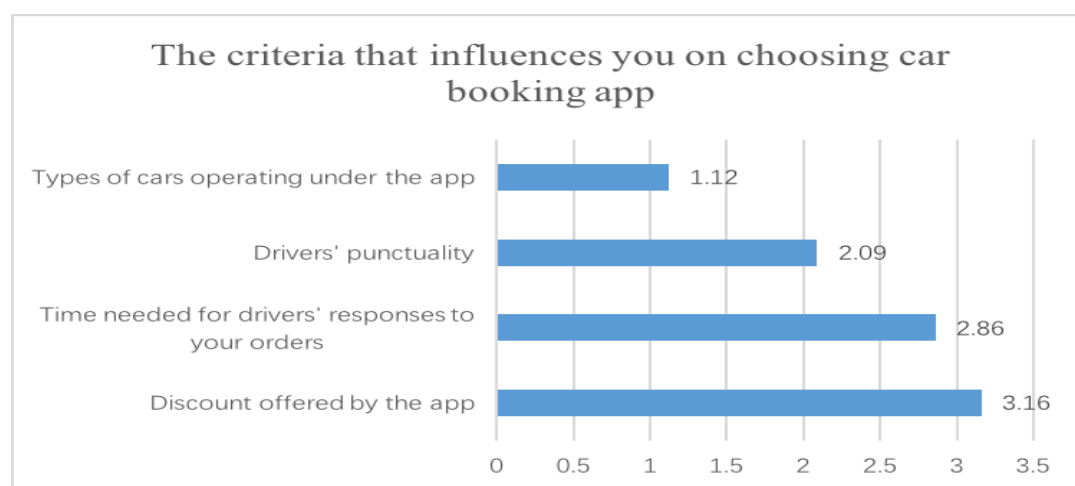


The Figure 1 illustrates that there are 59.02% of the effective informants will response to the release of the exclusively-used taxi app, while the rest of them do not think it is a relevant concern. If people say “yes” to the question “will the release of a new app exclusively used by taxi industry influence you on choosing taxi”, they will then answer the question “if the taxi company releases a new app that allows you to order taxi, will you choose taxi more when you need a car”. If not, they do not need to. From the Figure 2, we can clearly see that 68.6% of participants who will be influenced by the release of a new app think the new released taxi app will stimulate their need for the taxi, while 31.4% of them do not think so. From the information above, it is clear from the Figure 3 that there are only 40.48% of the effective

informants will positively response to the release of the new taxi app, which infers that we are only 40.48% confident that the new taxi app can increase the demand for taxi. Despite the information that the number 40.48% tells, the influence of the new taxi app on the demand still matters a lot in the taxi industry. Apart from app's effects on the demand for the taxi, the number 18.53% that represents the people who response to the release of new taxi app but do not think they will use the taxi more often tells that the app has effects on other aspects. This concern will be a certain aspect stated in the further research.

From the analysis above, we can tell that taxi app is a relevant and potentially significant factor that influences the demand for the taxi, and we think the further discussion about the app itself should be conducted.

Figure 4: The criteria that influences you on choosing car booking app.



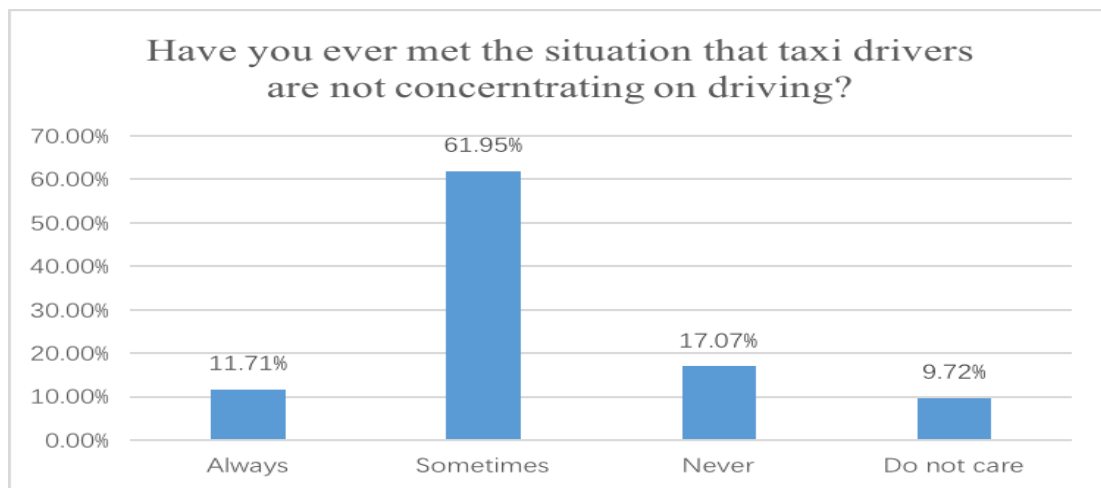
This question asks participants to rank the criteria that influences them on choosing car booking app from most important with 4 points to the least important with 1 point. In the Figure 4, discount offered by the app, which has a ranking score with 3.16, turns out to be the most important factor affecting the choice of car booking app, followed by the time needed for drivers' responses to consumers' orders with 2.86 and the drivers' punctuality with 2.09. The types of cars seem to be the least influential factor compared to other three, having the lowest score (1.12). From the information above, it can be concluded that taxi companies should set plans about discount campaigns to attract more consumers and improve the efficiency of car dispatching system if they want to release new taxi apps to compete with other online transport companies.

4.4.2 Findings of drivers' concentration level of driving

Taxi drivers' concentration level when they are driving is closely related to

customers' life safety, and we think it can be a significant factor that affects the demand for the taxi. In the research, participants were asked how frequent they found that drivers were not concentrating on driving but doing others things such as chatting on the phone, smoking or listening to loud music.

Figure 5: Have you ever met the situation that taxi drivers are not concentrating on driving?



From the graphic, 11.71% participants always meet such situation and 61.95% of them meet such situation sometimes, which means that 73.66% participants often see this situation. While, there are also 17.07% people saying that they never meet distractible drivers. Moreover, 9.27% participants claim that they do not care whether the driver is concentrating on driving. These statistics illustrate that driving without concentration wildly exists in the taxi industry, which needs people's attention. Therefore, the next two questions are designed to test how and to what extent the concentration level of taxi drivers affects the demand for the taxi.

Figure 6: Will taxi drivers' concentration level of driving influence you on choosing taxi?

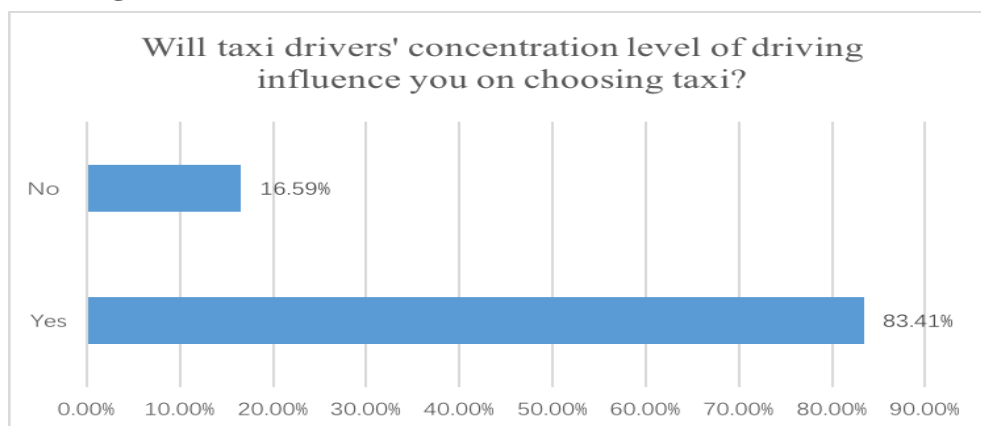


Figure 7: If taxi drivers increase their concentration level of driving, will you choose taxi more when you need a car?

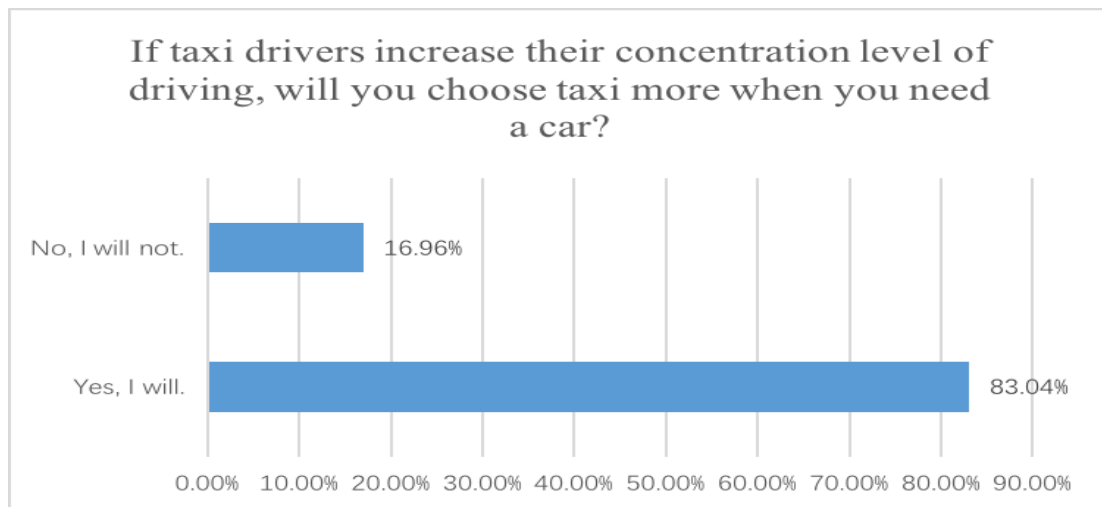
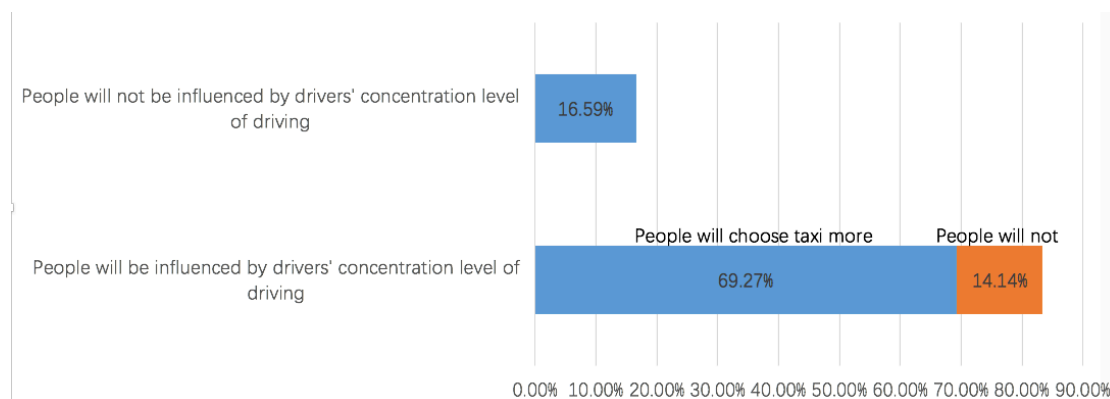


Figure 8: The specific percentage of people who will be influenced by drivers’ concentration level of driving and choose taxi more or will not if drivers increase their concentration level of driving shows in the whole sample.



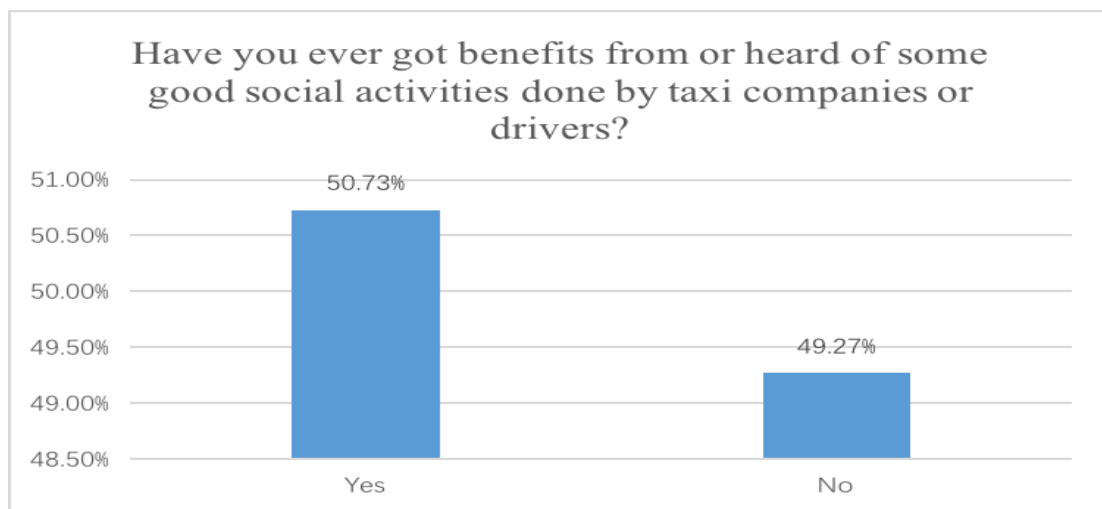
From the Figure 6 above, we can see that 83.41% of participants think drivers’ concentration level of driving will affect their choice on taxi. People who answer “yes” to question “will taxi drivers’ concentration level of driving influence you on choosing taxi” will move to answer the question “if taxi drivers increase their concentration level of driving, will you choose taxi more when you need a car”. If not, they do not need to. As a result, 83.04% of people who will be influenced by drivers’ concentration level of driving agree that they will choose taxi more when they need a car if drivers improve their concentration levels. All in all, 69.27% of the whole participants will be likely to drive the demand for the taxi regarding the improvement of drivers’ concentration level. The result shows that drivers’ concentration level should be a big concern when taxi companies select and train their employees. On the other hand, the number 14.14% tells that although drivers’ concentration level is not a

direct related factor that stimulates the demand for the taxi, the possibility of it being an indirect related factor can not be ignored. Also, this factor may influence others aspects other than the demand for the taxi. The further study will illustrate more on these perspectives.

4.4.3 Findings of taxi company’s good social purpose

Good reputation can boost up the demand for the taxi as well.

Figure 9: Have you ever got benefits from or heard of some good social activities done by taxi companies or drivers?



In our study, we find out that only half of the participants have got benefit from or heard of some good social activities done by the taxi companies or drivers. In the following two questions, we try to figure out whether good social purpose is a factor related to the demand for the taxi and how it is related.

Figure 10: Will good social purposes of taxi companies or drivers influence you on choosing taxi?

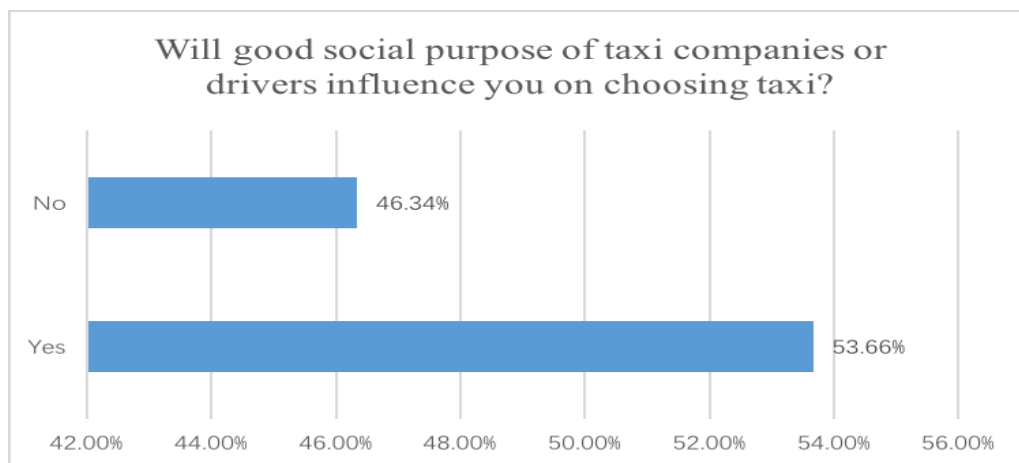


Figure 11: If taxi companies conduct more good social activities, will you choose taxi more when you need a car?

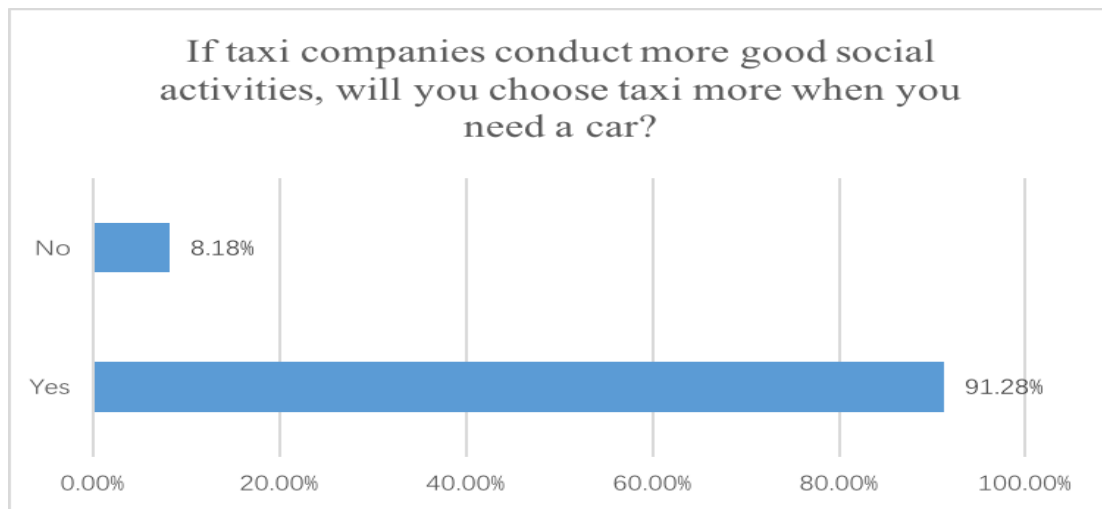


Figure 12: The specific percentage of people who will be influenced by taxi companies’ good social purpose and choose taxi more or not if taxi companies conduct more good social activities shows in the whole sample.

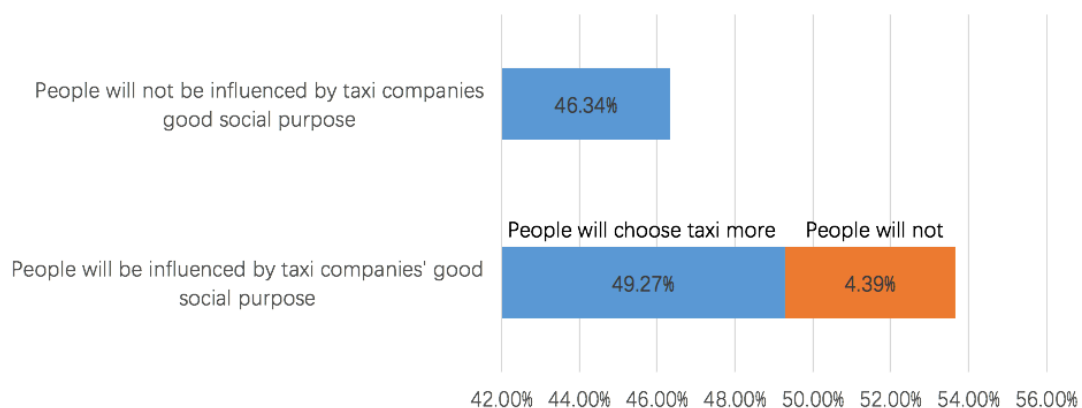


Figure 10 clarifies that 53.66% of participants will respond to taxi companies’ good social purpose, while the rest of them shows no interest. If people say “yes” to the question “will good social purposes of taxi companies or drivers influence you on choosing taxi”, they need to answer the question “if taxi companies conduct more good social activities, will you choose taxi more when you need a car”. If not, they do not need to. Within the people claiming “yes”, 91.82% of them think they will positively respond to the increase of good social purpose of taxi companies. These two pieces of information infer that taxi companies’ good social purpose may seem not to be such a strong factor that is related to the demand for the taxi, but the actual reward would be affluent if the good social purpose has been done by the taxi companies or the drivers. From the previous information that only a half of the participants know about the good social behaviors of taxi companies or the drivers, it

can be inferred that the statistic shown in Figure 10 may deviate from the real result because people who do not know the good social behaviors from the taxi industry might choose casually when they answer the question.

4.5 Discussion

The survey covers the factors that are important regarding their influence on the demand for the taxi but are hard to be measured quantitatively. Compared with other papers that focus on the factors affecting the demand for taxi, the factors we choose are unprecedented and abstract, such as drivers' concentration level of driving that is a factor caring more about the attitude of the taxi drivers. From the literature view, we can see that most of the previous studies paid attention to the economic factors such as personal income, gross domestic production and business cycle. In addition, there were also papers focusing on the competitors of taxi. However, most studies were conducted in the US and Europe. Considering the rising problem in the taxi industry in China, we wrote this paper, trying to help Chinese taxi industry compete against other new online transport companies and win back the market share taken up by those companies. In the future study, there will be more samples collected from customers that have different demographic backgrounds. Apart from the targeted further research aspects that are already mentioned in this research paper, we will also study the substitutions of taxi to give a deeper understanding of the taxi industry and give more pragmatic suggestions.

5. CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 Conclusion

This study indicates that a new app released by the taxi industry, drivers' concentration level of driving, and good social purpose of taxi companies affect the demand for the taxi in China. In addition, releasing a new app to order taxis, increasing drivers' concentration level, and conducting more good social purpose activities will increase the demand for the taxi. According to the survey, because most participants are not familiar with good social purpose, good social purpose has the least impact on the demand for the taxi.

The study also finds out four factors that attract consumers' attention when they are choosing different car booking apps. These factors are discount provided by different online transport companies, different types of cars operated by online transport companies, time needed for drivers' responses to consumers' orders, and punctuality of drivers. From the survey, discount offered by different online transport companies attracts consumers most.

5.2 Limitations

One limitation of this study is that the sample size could be larger so that the study can draw more accurate conclusions. Most participants are university students from Zhejiang, China; some participants are commuters; only a few participants are the old. In the future study, the survey needs to be distributed to more citizens from Zhejiang and include more kinds of citizens. Also, since there are many factors affecting the concentration level of the taxi drivers when they are driving, the current study has not explored those factors in detail. Therefore, in the future study, those factors will be included to specifically figure out which one affects the demand for the taxi most. As for discount offered by apps, this study does not figure out the specific discount that the new app should provide to attract most consumers. As for time needed for drivers' responses to customers' orders, the study also does not figure out the maximum waiting time that consumers are willing to take and the minimum waiting time that consumers prefer to take. As for the punctuality of taxi drivers, this study does not investigate the maximum minutes that if necessary, taxi drivers are allowed to be late.

5.3 Recommendations

From this study, the taxi industry should focus on releasing new taxi-booking app to attract more consumers. The new app should offer appropriate discounts to consumers. By creating a network between every full-time taxi driver, taxi companies should make customers wait for responses for least time. Also, taxi drivers' punctuality and concentration level of driving should be considered when taxi companies select and train their drivers. If possible, taxi companies need to set stricter rules to standardize drivers' driving behaviors. To monitor whether taxi drivers obey rules, the taxi companies can install closed circuit televisions in taxis, and they can get feedback from customers about drivers' concentration level of driving by reviewing the comments posted online and the ranking about drivers given by consumers. Considering that people are not familiar with what the taxi companies are doing or what they have done, taxi companies can promote their public reputation and advertise more to make people be familiar with their good social activities.

APPENDIX

Questionnaire

1. What's your gender?
 - a. Male
 - b. Female
2. Will you choose taxi when you need a car?
 - a. Yes
 - b. No
3. Will the release of a new app exclusively used by taxi industry influence you on choosing taxi? (If you choose "Yes", please move to question 4 and 5. If not, please move to question 6.)
 - a. Yes
 - b. No
4. If the taxi company releases a new app that allows you to order taxi, will you choose taxi more when you need a car?
 - a. Yes
 - b. No
5. Please rank the criteria that influences you on choosing car booking app from most important to the least important.
 - a. Discount offered by the app
 - b. Types of cars operating under the app
 - c. Time needed for drivers' responses to your orders
 - d. Drivers' punctuality
6. Have you ever met the situation that taxi drivers are not concentrating on driving?
 - a. Always
 - b. Sometimes

- c. Never
 - d. Do not care
7. Will taxi drivers' concentration level of driving influence you on choosing taxi? (If you choose "Yes", please move to question 8. If not, please move to question 9)
- a. Yes
 - b. No
8. If taxi drivers increase their concentration level of driving, will you choose taxi more when you need a car?
- a. Yes, I will
 - b. No, I will not
9. Have you ever got benefits from or heard of some good social activities done by taxi companies or drivers? (For example, free cars for college entrance examination students)
- a. Yes
 - b. No
10. Will good social purpose of taxi companies or drivers influence you on choosing taxi? (If you choose "Yes", please move to question 11. If not, the survey is over.)
- a. Yes
 - b. No
11. If taxi companies conduct more good social activities, will you choose taxi more when you need a car?
- a. Yes, I will
 - b. No, I will not.

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