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A STUDY ON CUSTOMER SATISFACTION AND TRUST AMONG TAXI USERS IN TRICHY CITY

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ABSTRACT

Taxis play an important role as a transportation alternative in many cities. In developed countries, taxis tend to be used as a substitute for private vehicles by passengers who use the service for convenience reasons or because they do not want to own a car. In developing countries, taxis are often used to supplement inadequate public transport systems based on buses or trains. But the role played by taxis can be as diverse as one can think. This study intends to provide a comprehensive and systematic analytical overview of existing global taxi schemes and their respective policies and regulations. A review of the literature regarding energy and sustainability issues is also presented. The importance of taxi operations in delivering good services in developing country cities is focused in the final part of the study. This paper determines is to determine the customer's satisfaction and trust among taxi users. A total number of customers taken for the study are 134. Questionnaires are used to conduct data collection and then analyzed using statistical techniques: Chi-square test, correlation and percentage analysis. The study reveals that the customers use taxi services due to technology, luxury, convenience and safety purpose.

INTRODUCTION

Taxis play an important role as a transportation alternative in all parts of the world. Although sometimes defined as a semi public transport mode, the taxi service is, in fact, the first public transport in small towns when the distances between common origins and destinations become too large to be traveled by non-motorized modes. According to Lowitt (2006), however, the demand for taxi services is highly heterogeneous and differs in developed and developing countries.

In developed countries, taxis tend to be used as a substitute for private vehicles by passengers who use the service for convenience reasons or because they do not want to own a car, even though they can afford it. Lowitt (2006) observes that, as in this market taxis tend to operate on a non-shared basis and their supply is limited by legislation, they can be a reasonable source of income for taxi operators. This was, for example, the market she considered in her study with the urban areas of Cape Town, Johannesburg and Durban, all in South Africa. In developing countries, taxis are often used to supplement inadequate public transport systems based on buses or trains. In those cases, they may be also characterized by shared taxis and low cost single passenger services (e.g., motor tricycles or motor quadrucycles in India and Bangladesh, and mototaxis in Brazil). These are services demanded by upper lower income users who do not own private motorized vehicles. Although this is usually not the case in Brazil, the market in many developing country cities is quite often unregulated.

For Lowitt (2006), unregulated markets result in an oversupply of services, high competition for passengers and, as a consequence, low fares and low incomes for taxi operators. But the role played by taxis can be as diverse as one can think of. As heavy traffic volumes can make roads dangerous and difficult to cross, it is reported in World Bank (2002), for instance, that businesspersons routinely take taxis in Jakarta just to get safely to the other side of the busiest thoroughfares. In Hong Kong, according to Transport Advisory Committee (2008), taxis are a mode of transport frequently used by many overseas visitors. Therefore, they help to form Hong Kong's international image. Also, Mulley (2010) defends that shared taxi-schemes could be developed within a deregulated environment to meet rural accessibility needs, in locations where the provision and quality of bus based public transport remains erratic. Those three examples show some of the diverse functions that taxis can have in transport systems.

As this study intends to provide a comprehensive and systematic analytical overview of existing global taxi schemes and their respective policies and regulations. We start the analysis with a discussion of the general

characteristics of taxi services. Next, in the third section of the document, we discuss specifically regulation and management strategies usually applied in those systems we also present a review of the literature regarding energy and sustainability issues, in section 4. These are some of the elements we rely on to discuss the future situation of the city of Rio de Janeiro when hosting the FIFA World Football CUP -2014 and the Olympic Games of 2016.

GENERAL CHARACTERISTICS OF TAXI SERVICES

The discussion started in the introduction of this paper clearly shows that taxis perform an important function in urban transport markets in both developed and developing countries. As passengers are vulnerable to exploitation by operators, Gwilliam (2005) observes that entry to the market and fares are often regulated to avoid it. This is particularly true in industrialized countries, although it can be also found in developing countries (e.g., in Brazil). The same author states, however, that the limited number of licenses increases their acquisition value. As a consequence, there is some monopoly profit for operators at the expense of users.

That is one of the reasons why these characteristics of the taxi systems (i.e., the number of vehicles and the fares) are usually investigated in studies trying to assess their level of service. Gamrat (2001), for example, found in his study in the city of Pittsburgh (in the state of Pennsylvania, USA), that the availability of taxis was inadequate. He even suggested that one or more taxi companies could be added to the local market. His suggestions were apparently based on the fact that Pittsburgh had, if compared to cities of about the same size, the fewest number of firms, the second fewest number of taxis, and the second lowest number of trips per thousand citizens. Thus, he concluded that the level of service in the area was inadequate when compared to similar metropolitan areas. Furthermore, he identified the regulatory environment in which the taxis were operating as the major reason for the inadequate level of service. In the system established by the Pennsylvania Public Utilities Commission, potential entrants must prove that current firms are not satisfactorily servicing their customers.

As potential firms must submit their plans to the PUC and they become open to public inspection, this gives the incumbents time to prepare counter arguments against the entrants. According to Gamrat (2001), this system does not make for a level playing field. Too many or too few taxis licensed in a city can have serious effects not only on the availability and quality of service, but also on the economic viability of the taxi business. Schaller (2005) even states that setting the number of cabs is one of the most important decisions made by taxicab regulators and elected officials, in cities that control the number of taxis by law or regulation. The same author identified, through multiple regression modeling of the number of taxis in 118 cities in the United States, three primary factors affecting the demand for taxi service.

They are:

- The number of workers commuting by subway,
- The number of households with no vehicles available, and
- The number of airport taxi trips.

Although the results obtained by Schaller (2005) can be used to guide regulators in measuring changes in local demand for taxi service, this is not enough for precisely quantifying the demand for taxi service. That difficulty had already motivated other authors to search for mathematical models that could better represent the complexity of the system. One of the possible alternatives for understanding the equilibrium nature of taxi services and for assessing the impacts on traffic congestion due to taxis is to model taxi services in a network context. Yang and Wong (1998) have developed such a model as an initial attempt to describe how vacant and occupied taxis would move in a network of streets to search for customers. The model could determine a number of system performance measures at equilibrium, such as vacant taxi movements and taxi utilization for a given network and origin-destination demand patterns. The effects of the taxi fleet size and the uncertainty on the system performances were explicitly taken into account.

In their conclusions, the authors were able to show how the average taxi utilization decreases sharply with the number of taxis operating, and how the higher the taxi utilization, the larger the average customer waiting time. Wong et al.(2001) extended the simple network model of urban taxi services proposed by Yang and Wong (1998) in order to incorporate congestion effects and customer demand elasticity. A two-level model formulation was

proposed for taxi movements in congested street networks. Their network equilibrium model was able to describe simultaneous movements of vacant and occupied taxis as well as normal traffic in an optimal manner from the users' point of view. The upper-level problem was represented by a set of linear and nonlinear equations ensuring that the relation between taxi and customer-waiting times and the relation between customer demand and taxi supply were satisfied. The nature of demand-supply equilibrium in a regulated market for taxi service was also investigated by Yang etal.(2002).They used a network model that can determine a number of system performance measures at equilibrium, such as utilization rate for taxi and level of service quality, to predict the effects of alternative regulations on system performance. Regulations were also studied by Fernandez et al.(2006), who were in fact looking for their social convenience. The diagrammatic approach they have used to study the characteristics of the cruising taxi market has allowed the representation and analysis of different operating conditions. System conditions were then described in terms of number of taxis in operation, number of runs produced, occupancy rates, and fares charged, average production costs and generalized prices.

They have shown that, for a perfectly adapted system, the long run average system cost function is always decreasing. That happens because the increase of a marginal passenger produces two positive externalities in the long run. Firstly, waiting times are reduced for all passengers. Secondly, the average taxi operating cost per run is also reduced, because occupancy rate increases. They concluded that a unique equilibrium exists for free market conditions under short and long run conditions, which corresponds to monopolistic competition equilibrium. They also describe how such equilibrium is obtained from the interactions between demand and supply conditions. Wong et al.(2008) further extended the model of urban taxi services in congested networks to the case of multiple user classes, multiple taxi modes, and customer hierarchical modal choice. The idea was to take into account the several classes of customers with different values of time and money, and several modes of taxi services with distinct combinations of service area restrictions and fare levels.

The introduction of multiple taxi modes can be used, for example, to model the differentiation between luxury taxis and normal taxis by their respective service areas and customer waiting times. One of the parts of their modeling approach was a combined network equilibrium model, which was formulated as a special case of the general travel demand model. Therefore, most of the parameters were observable, given that such a calibrated transport planning model was already available. The authors have demonstrated the effectiveness of the proposed methodology with the use of numerical example. Yang, Wong and their collaborators have also examined economic aspects of the taxi service operation, such as fare structures and profit. Yang et al.(2010), for example, used an extended taxi model with an explicit consideration of perceived profitability to look into the market effects of adopting a nonlinear fare structure with declining incremental charges. The expected profit that a taxi driver expects to receive from picking up a customer in a particular place has great impact on the driver's choice of location in the search for customers.

The fare structure directly governs the profitability of taxi rides of different distances originating from different locations. Thus, the nonlinear fare structure proposed could help restore a level playing field for taxi operators whose businesses have been affected by taxi drivers offering fare discounts or accepting requests for discounted fares for long trips. Sensitivity analyses of social welfare and profit gain were conducted with respect to the parameters in the nonlinear fare structure for the Hong Kong taxi market. The results of the nonlinear fare amendment have not been prejudicial to the customers. Also, taxi operators' profits were not reduced. In summary, the simple network model of urban taxi services developed by Yang and Wong (1998) was further enhanced and extended in various ways to deal with demand elasticity, multi-class taxi services with service area regulation, congestion effects, multi-period dynamic taxi services with endogenous service intensity, and nonlinear pricing of taxi services (Wong et al., 2001, Wong et al., 2008, Yang et al., 2002, Yang et al., 2005a, Yang et al., 2005b and Yang et al., 2010a). In a recent study, Yang and Yang (2011) also investigated the equilibrium properties of an aggregate taxi market. Three specific issues were analyzed for meeting functions that exhibit increasing, constant and decreasing returns to scale.

Firstly, service quality in terms of customer wait/search time and average profit per taxi were examined jointly in relation to taxi fleet size. An increase in taxi fleet size led to improvements in both service quality and market profitability. Secondly, the properties of the socially optimal solution were examined. It was found that the taxi

fleet size should be chosen such that the total cost of operating vacant taxis equals the total cost of customer waiting time multiplied by an asymmetric factor of the meeting function, and that taxi services should be subsidized at social optimum only when the meeting functions show increasing returns to scale. Thirdly, the Pareto-efficient services were examined for trade-offs between social welfare and profits in the light of partially conflicting objectives of the public sector and the private taxi firms using a bi-objective maximization approach. The taxi utilization rate and the customer wait/search time or service quality are proved to be constant along the Pareto frontier and equal to those at social optimum if the meeting functions show constant returns to scale. There is no doubt that fares and number of vehicles are central elements to understand taxi systems. However, they are certainly not enough to fully describe them. Issues such as drivers' incomes, leasing, violence, and interactions with law enforcement are important parts of the picture and must be also examined.

This was precisely done by Bruno (2009), who reported the results of a 49-item survey instrument that was administered to 920 Chicago taxi drivers between June and August of 2008. Some of the answers were not really a surprise, such as over 81 percent of the respondents agreeing or strongly agreeing that drivers need a fare increase. On the other hand, it was a surprise, and not very pleasant, the fact that a significant number of drivers was earning well below minimum wage and working nearly 13 hours per shift. This conclusion does not necessarily apply to all other cities in the United States, but it may be an indication that a similar problem may exist in some of them. A comparison of the last point raised above in the report of Bruno (2009) with some of the suggestions made in the study of Lowitt (2006) show how taxi systems are strongly context-dependent. The aim of Lowitt's (2006) introductory paperwas to stimulate thinking around the potential of the metered taxi industry in South Africa's major urban centers in the creation of jobs. For her, despite the absence of a culture of metered taxi usage, the increased traffic densities and city densities suggested that the latent demand would soon become effective demand.

That would happen through the natural process of developing urban centers and their inevitable problems of congestion and parking. Also, on the supply side, the sector is biased towards owner operators and smaller companies and the skills required to participate in the industry are low. The combination of factors indicated that at least 13,000 jobs (or 26,000, using existing taxi numbers) could be created at minimum cost to the country. Lowitt`s conclusions emphasize that opportunities to generate jobs with little effort and little cost in a country with high unemployment rates are rare, but the metered taxi industry offers such an opportunity. Differently from the case previously discussed, the important point here was not the wage values, but the opportunity to create jobs.

SATISTICAL ANALYIS

Chi-Square Test

I. Checking relationship between Age and Frequency of Taxi using.

Hypothesis

H0: There is no significant difference between age and Frequency of Taxi using.

H1: There is a significant difference between age and Frequency of Taxi using.

Age Vs Frequency of Taxi using

PARTICULAR			Frequency of Taxi using					
			DAILY	TWICE IN A WEEK	WEEEKLY ONCE	TWICE IN A MONTH	RARELY	Total
AGE	18-25	Count	5	5	5	11	38	64
		Expected Count	4.8	10.0	7.2	7.6	34.4	64.0
	26-35	Count	5	16	10	5	11	47
		Expected Count	3.5	7.4	5.3	5.6	25.3	47.0
	36-45	Count	0	0	0	0	5	5

		Expected Count	.4	.8	.6	.6	2.7	5.0
	46-55	Count	0	0	0	0	18	18
		Expected Count	1.3	2.8	2.0	2.1	9.7	18.0
Total		Count	10	21	15	16	72	134
		Expected Count	10.0	21.0	15.0	16.0	72.0	134.0

Result:
Calculated χ 2 value : 47.987
Tabulated χ 2 value (0.05, 12): 21.026
Degrees of Freedom : 12
Significance Level : 5%
Comparison : Calculated value < Tabulated value

Interpretation:
The table value is 21.026. The calculated value is 47.984. Thus the calculated value is greater than the table value. Therefore H1 is accepted.
II. Checking relationship between Occupation and Taxi Preference

Hypothesis
H0- There is no relationship between Age Vs Taxi Preference
H1- There is relationship between Age Vs Taxi Preference
Age * Preference

			1				
			OLA CABS	FASTRACK	FRIENDS TAXI	OTHERS	Total
AGE	18-25	Count	41	18	0	5	64
		Expected Count	39.6	19.6	2.4	2.4	64.0
	26-35	Count	25	17	5	0	47
		Expected Count	29.1	14.4	1.8	1.8	47.0
	36-45	Count	5	0	0	0	5
		Expected Count	3.1	1.5	.2	.2	5.0
	46-55	Count	12	6	0	0	18
		Expected Count	11.1	5.5	.7	.7	18.0
Total		Count	83	41	5	5	134
		Expected Count	83.0	41.0	5.0	5.0	134.0

Result:
Calculated χ 2 value : 18.764
Tabulated χ 2 value (0.05, 12): 16.919
Degrees of Freedom : 9
Significance Level : 5%
Comparison : Calculated value < Tabulated value

Interpretation:
The table value is 16.919. The calculated value is 18.764. Thus the calculated value is greater than the table value. Therefore H1 is accepted.
4.3. CORRELATION ANALYSIS

I. Checking degree of relationship between Age and Frequency of using taxi.

Hypothesis:

H0: There is no relationship between Age and Frequency of using taxi.

H1: There is a relationship difference between Age and Frequency of using taxi.

Correlation between Age and Frequency of using taxi.

		AGE	frequency
AGE	Pearson Correlation	1	.161
	Sig. (2-tailed)		.062
	N	134	134
Frequency of using taxi	Pearson Correlation	.161	1
	Sig. (2-tailed)	.062	
	N	134	134

Interpretation:

The relationship between age of the respondents and the frequency of using taxi is correlated (ie) the correlation value tends to 1 (0.161)

CONCLUSION

In this paper we have examined some of the most relevant aspects of the taxi users in trichy city, in order to provide a comprehensive and systematic analytical overview of existing global taxi services. The research reflects the particular attitudes and behaviours of customers towards internet banking. On the basis of research results, recommendations have been proposed. It was found that most of the respondents seek for luxury, technology, comfort, convenient.

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