



SAFETY AND SECURITY IMPROVEMENT IN PASSENGER CAR IN COIMBATORE

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Abstract

Passenger car poses a higher risk of safety and security since there happen to be more luxury and speed in a car. The problem becomes worse in developing cities, because of the lack of suitable and integrated approaches. The aim of this research is to explore the perception of safety and security problems faced by the car owners. This perception is used as a base to develop an improvement agenda for the particular context of Coimbatore city. The research employs a questionnaire survey to collect the perception data. This research explains the perception of car owners, concerning safety and security of paratransit in Coimbatore city. For this, 150 car owners have been selected randomly and collect their opinion about the safety and security in car transportation through a structured questionnaire. Simple percentage analysis and factor analysis have been applied for analyzing the data. The rank of importance for each factor is analyzed by applying the factor analysis. Analysis shows that the user is the most important party involved. The understanding and awareness of the car owners is the most important variable to improve the condition. Three aspects of an improvement agenda are proposed based on the perception data, namely technology, management, and institution.

Key Words: *Passenger Car, Car owners, Safety, Security, Perception.*

1. Introduction

Safety and security may be general terms in our daily life, but the study of these in the transportation sector has been very limited, especially in developing cities. Worldwide, there are estimated to be approximately one million road accident fatalities and ten million people injured annually, many with long-term disabilities. Almost 70% of these occur in the developing or emerging world¹. Many people agree that the safety and security aspect in passenger car operation is very important, as private or public transportation closely relates with human lives on a larger scale or in greater numbers as many passengers happen to be riding in one car.

However, many people and experts agree that congestion in urban areas is worsening, especially in developing cities in India. They believe that the existence of passenger car is a key to solve the problems. There are two options to overcome these problems, namely high capital intensive and low capital intensive. The latter means that the improvement should be conducted using existing resources to solve the problems at low cost. The approach takes more time to produce the expected impact, although in the long run the impact will be more effective. Low capital intensive seems more feasible in terms of financial and economic aspects for developing countries. The concrete term of this approach is to improve the existing urban transport mode's performance rather than implementing new transport modes with more advanced technology which is also capital intensive. In addition, the provision of passenger car faces a challenge to maintain the passengers and to attract the potential car owners. The improvement of passenger car performance requires comprehensive planning, where safety and security are two of the important aspects.



As a contribution to improve the safety and security conditions in the operation of passenger car in developing cities, this research has been conducted to contribute a new approach to deal with the problem by incorporating car owners' perception. In many instances, customer perception of safety and security are as important to understand as the actual conditions; a customer satisfaction survey can assist in uncovering these perceptions^{8,9}. Perception from the parties involved reflects their attitudes. Attitudes, represented by the factors that are in fact composite variables, contribute significantly to the explanatory power of the model. The experience of risk, as well as orientation in traffic, is expected to be influenced by personality characteristics²². Reducing the individual to simple socio-demographic variables involves a loss of information on the decision-makers preference and consequent choice⁶.

This research aims to explore the car owners' perception concerning the safety and security problems in the operation of their car. The rank of importance for each factor has been analyzed by applying the factor analysis to reveal the most important variable. The result of this factor analysis is used to develop an improvement agenda for the context of developing countries. The suggestions described here include only the possible, practical, and the most suitable ones to meet the requirements of the parties involved. The proposed improvement will act as a complement to the existing road safety action plans.

2. Safety And Security In Passenger Car

Passenger car provides a mobility service to the car owners, as well as producing a wide impact on the system. Consequently, it should be operated in such a way as to achieve an efficient and effective transportation system. To achieve this, there is a need to measure the quality of service as a way to evaluate its performance. The security class consists of three aspects, namely^{7,8}:

- a) **Safety from crime:** Staff/police presence; lighting; visible monitoring; layout; identified help points;
- b) **Safety from accidents:** Presence/visibility of supports; avoidance/visibility of hazards; active safeguarding by staff;
- c) **Perceptions of security:** Conspicuousness of safety measures; "mastery of network"; press relations.

Safety and security measures evaluate the likelihood that passengers will be involved in an accident, be it vehicular or otherwise (safety) or become the victim of a crime (security). They can also measure various aspects of workplace safety. Most safety and security measures can be calculated straight away, and require little more than careful record keeping. Measures reflecting actual incidents should be reported more frequently (e.g. monthly), while indirect measures reflecting potential levels of safety and security, such as the ratio of transit police officers to transit vehicles, can be reported annually^{8,9}.

The main actor causing safety problems in road activity is the driver. Drivers tend to satisfy their motives in traffic as well as in other areas of life. This pushes them to drive faster and more hazardously. However, in reality car drivers adapt to the risks involved in driving to such a level that they do not generally feel any risk in a given traffic situation, or their subjective risk assessments approach zero. Car drivers avoid the feeling of risk just as they avoid pain, which is known as the zero risk theory. The assumption is that there is a risk threshold above which the risk is experienced as aversive. A driver feels the risk of a collision as an emotional and immediate experience, which has been called ostensive risk. A risk factor is defined as any factors related to traffic that have been shown to increase the risk of



traffic accident or is suspected to increase traffic accident risk. Several risk factors in traffic during working hours are saving time, fatigue, using a mobile telephone, or health problems. The following table shows the Total Number of Accidents, No. of Persons Injured and No. of Persons Killed in Road Accidents in Tamilnadu and Coimbatore.

Table 1 : Distribution of Total Number of Accidents, No. of Persons Injured and No. of Persons Killed in Road Accidents in Tamilnadu and Coimbatore

Region	Total No. of Accidents	No. of Persons Injured	No. of Persons Killed
Tamilnadu	65562	74571	16157
Coimbatore	1299	1191	277

Source : Statistical Data from Tamilnadu Government, 2018.

3. Research Design and Sampling Technique

This research employs a questionnaire survey to collect perception data from the car owners. The questionnaire was distributed directly to the respondents using a simple random sampling method. The data from car owners was collected by on-board survey. All car passengers have been asked to fill out the questionnaire, but some passengers or drivers refused to answer. The location and route of paratransit to distribute the questionnaire was chosen simply at random, without particular purpose. The number of answered questionnaires amounted to 150 car owners. The survey was collected in March, 2019. The collected data were analysed through simple percentage analysis and factor analysis.

4. Results and Discussion

Demographic characteristics of the respondent are shown in Table 2.

Table 2: Demographic Profile of the Respondents

No.	Variables	No. of Respondents	%
1	Age		
	Below 30 Years	31	20.7
	30-40 Years	29	19.3
	41-50 Years	49	32.7
	Above 50 Years	41	27.3
	Total	150	100.0
2	Gender		
	Male	96	64.0
	Female	54	36.0
	Total	150	100.0
3	Educational Qualification		
	School Level	24	16.0
	College Level	79	52.7
	Professional	19	12.6
	No Formal Education	28	18.7
	Total	150	100.0
4	Occupational Status		
	Business	31	20.7
	Govt. Employee	29	19.3



	Private Employees	63	42.0
	Professional	18	12.0
	Others (Student, Housewife, etc)	9	6.0
	Total	150	100.0
5	Family Monthly Income		
	Up to Rs.50,000	22	14.7
	Rs.50,001-75,000	49	32.7
	Rs. 75,001- 1,00,000	56	37.3
	Above Rs.1,00,000	23	15.3
	Total	150	100.0
6	Marital Status		
	Married	109	72.7
	Unmarried	41	27.3
	Total	150	100.0

From the above analysis it is found as follows:

1. 20.7% of the respondents belongs to below 30 years aged, 19.3% of the respondents belongs to 30-40 years aged, 32.7% of the respondents belongs to 41-50 years aged and 27.3% of the respondents belongs to above 50 years aged.
2. 64.0% of the respondents are male and remaining 36.0% of the respondents are female.
3. 16.0% of the respondents are educated till school level, 52.7% of the respondents are educated will college level, 12.6% of the respondents are professionally qualified and 18.7% of the respondents are having no formal education.
4. 20.7% of the respondents are doing business, 19.3% of the respondents are working in government sector, 42.0% of the respondents are working in private sector, 12.0% of the respondents are professional and 6.0% of the respondents belongs to some other category like students, housewife, etc.
5. 14.7% of the respondent's family are earning up to Rs.50000 in a month, 32.7% earning Rs.50001 to 75000 in a month, 37.3% earning Rs.75001 to 100000 in a month and 15.3% earning above Rs.100000 in a month.
6. 72.7% of the respondents are married and remaining 27.3% are unmarried.

Each questionnaire for each group of respondents contained three sections, namely covering general, safety, and security aspects. In the general section, the respondents were asked about their travel characteristics in making use of paratransit, such as personal data, purpose of the trip made, transport mode, number of trips, insurance, and so forth. In the safety and security section, the respondents were asked whether they had experienced accidents and criminal incidents when riding the paratransit. In addition, they were asked to rate the seriousness of the accident or security on the Likert-scale from 1 to 5. The respondents were asked to state their perception concerning the most important reason for the existing condition, the most responsible party involved, and the most important aspects that needed to be improved. Finally, the respondent was asked whether he/she would make use of paratransit in the future when there is an improvement in the safety or security aspect.

In this research, the respondents' experiences were divided into two types, namely direct and indirect experiences. Direct experience means that the respondents experienced the incident directly by themselves, while indirect experience means that the respondents heard about the incident from family, friends, or other people. The indirect experience was intended to capture the complete occurrence of the



accident or criminal incident, especially for the respondent who had not experienced it himself. Because this research explores the perception of the parties involved, it was beneficial to inquire into the respondent's real experience (meant for whom has experienced it) or what the respondent heard about other people's experience (for whom has not experienced it). The perception was influenced by past experience, including other people's experiences. The types of incident comprise car collision, car grazing, car breakdown and car sliding. The number of accidents ranged from once up to three times. The seriousness of the accident was light. The number of accidents was approximately once, while the seriousness was light to fair.

One important aspect in safety and security problems was the financial scheme to cover the impact of incidents. The present practice is that the victim should cover the costs resulting from a given accident/criminal incident, which many times turned out to be very high. In this research, the respondents were asked whether they know about the insurance available, realize the importance of insurance, and who should pay the insurance premium. The respondents generally know about the insurance and do realize that insurance was important. However, the respondent did not agree to pay the insurance premium.

Table 3: Respondent's Direct Experience of safety

Respondent	Opinion	Percentage
Did you experience the accident when riding?	Yes	10.7%
	No	89.3%
Number of accidents	Once	44.4%
	2-3	44.4%
	More than 3	11.2%
Seriousness	Very Light	22.2%
	Light	44.4%
	Fair	22.2%
	Serious	0%
	Very Serious	11.2%

Table 4: Respondent's Indirect Experience of Safety

Respondent	Opinion	Percentage
Did you experience the accident when riding?	Yes	36.5%
	No	63.5%
Number of accidents	Once	80.8%
	2-3	19.2%
	More than 3	0%
Seriousness	Very Light	8%
	Light	28%
	Fair	16%
	Serious	16%
	Very Serious	32%



Table 5: Respondent's direct experience of Security

Respondent	Opinion	Percentage
Did you experience any criminal incident when riding ?	Yes	63.5%
	No	36.5%
Number of accidents	Once	63.6%
	2-3	27.3%
	More than 3	9.1%
Seriousness	Very Light	4.5%
	Light	18.2%
	Fair	40.9%
	Serious	18.2%
	Very Serious	18.2%

Table 6: Respondent's Indirect experience of Security

Respondent	Opinion	Percentage
Have you heard that other people experienced any criminal incident when riding?	Yes	57.7%
	No	42.3%
Number of accidents	Once	68.8%
	2-3	31.3%
	More than 3	0%
Seriousness	Very Light	9.1%
	Light	33.3%
	Fair	21.2%
	Serious	30.3%
	Very Serious	6.1%

5. Perception of Safety and Security

Factor analysis was applied to identify the loading of each response from the respondent concerning perception of safety and security. To test the suitability of application of this method, Bartlett's test of sphericity was applied. Because the number of variables for each research object was not so great, a priori criteria were used as the criteria to extract the number of factors. If the ultimate goal of the factor analysis is to obtain several theoretically meaningful factors or constructs, varimax rotation is appropriate.

6. Factor Analysis

The loading factor for car owners' perception is shown in the following table, which shows four relevant factors.



Table 7: Loading factor for Car Owners' Perception of Safety

Factors	Variable for Each Factor	Loading
Reason for still using paratransit, despite having experienced or heard of an accident in paratransit	Paratransit is cheap	0.996
	Paratransit is comfortable	0.988
	Paratransit is safe and secure	0.970
	Paratransit is available everywhere	0.856
	Has no private car in his/her family	-0.814
Reason for bad safety quality	Low awareness of the car owners	-1.000
	Low awareness of the driver	0.984
	Low law enforcement	0.964
	Low car quality	0.845
	Low education of the driver	0.823
The most responsible party involved in the safety of paratransit operation	User	1.001
	Police	0.997
	Local Government	0.941
	Traffic and Road Transport	-0.928
	Car owner	0.569
Improvement aspects to increase the safety of paratransit operation	Safety education for car owners	0.955
	Safety education for driver	-0.942
	Improve car quality	0.903
	Improve law enforcement	-0.634

The four factors have significant value for Bartlett's test of sphericity in a range from 0.008 up to 0.065. The main reason for making use of paratransit was the financial motive, while the safety and security aspects were not the main consideration. As for the aspect of the reason for bad safety conditions in paratransit operation, the highest loading factor was the low awareness of the users. This answer was rather surprising, as they had identified themselves as the main reason for the bad safety conditions. However, this answer can be understood from the fact that the driver stops wherever the passenger wants to get on or get off. The passengers might be asking the driver as many times as they want to stop directly without giving the driver proper time to decelerate. This causes the driver to stop the car immediately, thereby exposing himself (and other road users) to great risk. That answer is in line with the other two factors. Firstly, the user was the most responsible party involved in the safety problems. Secondly, education about road safety was the most important initiative to improve the safety of paratransit operation.

7. Suggestions

These action drafts in general proved to be a valuable draft, which was a first collaborative step toward road safety action. Generally speaking, the action draft focused on infrastructure, the car owners, supporting policy, and on a general approach to road/traffic safety. Meanwhile, car transport was not mentioned explicitly in those drafts. It can be interpreted that passenger car transportation safety and security problems were treated as general car or usual road users. The car owners should possess a higher degree of skill and knowledge regarding safety and security. Another aspect is that the improvement in car transportation safety involves different parties, such as other car owners, drivers, or local governments, not only the Police or Department of Transportation. Improvement in safety and security is not a single approach but involves commitment from all parties responsible.



8. Conclusion

This paper has explored the perception derived from paratransit passenger car owners, concerning safety and security in transportation. The perception of the car owners involved was used to develop the suggestions. Using the factor analysis, the ranking of importance for each factor can be revealed. The understanding and awareness of both car owners and drivers of road safety and security is the most important variable in improving safety and security, which can be reached by training and education.

9. References

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