

**EVALUATION OF MODE CHOICE BEHAVIOUR AMONG
STUDENTS FOR SCHOOL-BASED TRIPS-A CASE STUDY FOR
KOLLAM CITY
THESIS REPORT**

submitted by

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of

Master of Technology in

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Declaration

I undersigned hereby declare that the project report, “**Evaluation of mode choice behaviour among students for school based trips- A case study for Kollam city**”, submitted for partial fulfilment of the requirements for the award of degree of Master of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of Karthik S. This submission represents my ideas in my own words and where ideas or words of others have been included; I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or factor source in my submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

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CERTIFICATE

Certified that this report entitled “**Evaluation of mode choice behaviour among students for school based trips- A case study for Kollam city**” is the report of thesis presented by **SHAHNAZ BEEGUM.S, TKM21CETE017 during 2022-2023** in partial fulfillment of the requirements for the award of the Degree of Master of Technology in Transportation Engineering of the APJ Abdul Kalam Technological University.

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Abstract

Research on children's school travel behavior has grown tremendously in the last decade. Millions of children travel to school in India every day, yet little is known about the journey. In this study, she investigated the distribution and determinants of school travel in the city of Kollam, India. For the pilot study, a total of 54 questionnaires were distributed to students and asked to fill them out. We also ask parents of elementary school children to fill out the form. A multinomial logit framework was used to model school trip selection decisions. The findings of the pilot study revealed that (70%) of the students do not prefer the school bus for school trip purposes. Only 30% of students prefer the school bus. The majority (48%) of students lived within a radius of more than 5 km from the school and 16% lived within a radius of 1 km. Most children (26%) prefer a car for school trips. 16% of children walked to school and 48% of children cycled. In order to attract children to use public transport or school buses, there is an urgent need to address the factors that make people reluctant to use school buses and to improve the road infrastructure around school to increase active travel among children.

Keywords: Multinomial logit model, School trip, Mode choice

Contents

Title	Page No
Acknowledgement	i
Abstract	ii
List of Figures	iv
1. INTRODUCTION	1
1.1 General	1
1.2 Objectives of the study	2
1.3 Gaps Identified	2
2. LITERATURE REVIEW	3
2.1. General	3
2.2. Study area selected for different studies	3
2.3. Data analysis done in various studies	5
2.4 Summary	8
3. METHODOLOGY	9
3.1. General	9
3.2 Site Selection	10
3.3 Identification of Attributes	10
3.3.1 Literature Reviews	11
3.3.2. Pilot study	11
3.3.4 List of attributes	15
3.4 Data Collection	16
3.5 Data Analysis	16
4. CONCLUSIONS	17
APPENDIX	18
REFERENCES	21

List of Figures

Fig. No	Caption	Page no
1	Interfaces for mapping and ordinary questionnaire pages.	6
2.	Methodology	9
3.	Students at the selected school	10
4	School buses available at the selected school	
5	Pie chart showing the household size of respondents	
6	Proportion of distance from home to school	
7	Pie chart showing household monthly income of the respondents	
8	Identification of type of vehicle respondents have	
9	School bus preferences	
10	Graph showing the type of vehicle respondents are preferring for school trip	
11	Reasons identified from those children who prefer school bus	

Chapter 1

INTRODUCTION

1.1 General

School journeys have totally different attributes compared to journeys for alternative functions (eg. work and recreation). Children's travel etiquettes differs from that of adults. Most faculty-going teenagers participate in taking selections relating to their school travel mode, whereas the varsity journeys of younger kids square measure set solely by their folks. faculty journeys are often thought-about a serious component moving road traffic. as a result of most faculty and workplace timings square measure similar, faculty journeys become a part of congestion traffic. due to numerous factors, as well as lack of correct road traffic infrastructure and poor social control and lack of lane discipline, Indian roads create serious traffic risk. faculty journeys are considerably studied in North yank and western European countries. Recent studies within these countries have primarily engrossed on the decline in the tendency of walking and cycling among schoolchildren and also the outcome fleshiness. Understanding students' faculty travel mode selection behavior is important to bolster or reshape their travel pattern and awareness of active and freelance quality, and additional promote their physical and psychological state. Understanding students' faculty travel mode selection behavior will facilitate government produce a higher travel setting for college travel, and reduce the share of menage escort. At the menage level, the associated travel demand are often reduced and also the travel price are often saved. From the social perspective, the menage escort, particularly the auto-based menage escort, leads to holdup and setting pollution close to faculty. Not solely has the road capability been degraded, however conjointly the access setting of college gate is affected negatively. Thus, it's necessary to investigate students faculty travel mode selection behavior to encourage an energetic and freelance modus vivendi, and eventually support the property development of the society.

1.2 Objectives of the study

- To conduct a questionnaire survey and to identify the factors which makes people reluctant to use school bus services
- To develop a demand model using SP, RP data

1.3 Gaps Identified

- Only few studies have been conducted regarding school trip mode choice in India
- Previous studies haven't focused on the aspect of sidewalk

Chapter 2

LITERATURE REVIEW

2.1 General

In order to do more research in the field of school trips for enhancing safety and reduction of traffic congestion the initial step is to identify the areas in which the recent research works were done, the identified factors contributing towards school trips, the gaps available to do more research. The coming section explains about the researches done so far, the study area and objectives selected, data collection, data extraction, data analysis and results they obtained.

2.2 Study area for different studies

A study was conducted in Kanpur to develop a sound understanding of travel mode choice behavior for school trips in India based on primary data collected from a representative sample of schools in the city of Kanpur, India. This study provides background information on the types of travel modes used for school trips and the factors that influence these choices. To the authors' knowledge, this study is the first to analyze school trips in relation to potential determinants of travel mode choice in a South Asian context. **(Nishant Singh and Vinod Vasudevan, 2018)**

The study aimed to explore parents' experiences of traveling to school and their travel mode choices with a focus on identifying barriers and facilitators of AST. Twenty parents of primary school children (4–12 years) in the West Yorkshire region took part in semi-structured interviews regarding school travel, informed by the domains theoretical framework. Framework analysis was used to identify key themes in the data and to create a comprehensive picture of parents' experiences of school travel at an individual and structural level. **(Sara M. Ahern et al., 2016)**

The study examines the school travel mode choice behavior of students aged 7–18 years in Beijing, China, based on data collected in the Fifth Beijing Resident Travel Survey. An integration of tree-based and logit models is used to examine the influence of key variables on school travel mode choice. In particular, the tree-based model is used to pre-select features that have a statistical effect on mode choice, and the logit-based model is used to gain a deeper understanding of the underlying decision processes and correlation effects of variables.

The aim of the study is to analyze the influence of parents' views on safety and traffic conditions along school routes on the choice of regime of younger teenagers. Younger teenagers in this study are defined as the age group from 12 to 16 years old, which is the non-driving, active age group. The results of the study show that there is a strong correlation between parental attitudes and the fashion choices of younger teenagers. Factors that influence parents' decisions to drive their teenagers to and from school include the distance between home and school, traffic congestion and crime on school routes. **(Mintesnot Woldeamanuel, 2014)**

The study took place in Germany on the basis of school trips. It is probably the first in Germany to simultaneously address a whole range of dimensions that can help to understand mode use: (1) driving characteristics, (2) characteristics of the child, (3) household context, (4) subjective concerns, attitudes and perceptions, (5) transport environment, (6) built environment and (7) social environment. The results are largely consistent with existing research regarding the effect of distance, age and gender differences. It is also well known that mothers' attributes influence children's travel, but fathers' attributes less so (here in terms of car use, occupation and age). **(Joachim et al., 2019)**

The study examines the opinions that are subject to modal choices regarding school trips, based on the opinions of students attending a senior high school in Brasília, Brazil. Using procedures suggested by the Theory of Planned Behavior (TPB), a set of beliefs was obtained through a focus group activity and used to support the development of the School Trip Modal Choice Scale (STMCS). The scale was subjected to a principal components analysis to verify the consistency of the belief-related factors and the direct measures of the TPB constructs. . In addition to identifying the main beliefs related to modal choice, the results showed that different TPB constructs may be correlated with the same belief, and thus assigning specific beliefs to each construct based on an initial intuitive classification may actually be a barrier to understanding them. **(Angela et al., 2020)**

The aim of the study is to investigate the role of parents' risk judgments (i.e. risk perception and apprehension), traffic safety attitudes, traffic priorities and students' walking accident experience and transport mode choice on school trips in Iran, a country with a poor road safety record . A total of 1078 questionnaires were randomly distributed among students of nine public and private schools in January 2014 in Rasht, Iran. The results of valid observations (n = 711) showed that parents with a high probability of accidents and strong concerns about the risk of injury to pupils while walking less often let their children go to school. Parents with high safety knowledge were also more likely to allow their students to walk to school. **(Milad et al., 2017)**

2.3 Data analysis done in various studies

Nine secondary schools were selected by stratified random sampling to obtain a sufficiently representative sample of students. Briefly, Kanpur's 112 urban districts were divided into eight zones of the roughly equal geographical area due to the amalgamation of neighboring clubs. These zones were further stratified by population density and then by school density. Finally, the selected schools were spatially distributed throughout the city and located in areas with representative population density and economic activity. To collect data on travel behavior, this study chose a self-administered questionnaire (knockout type), a method widely used in travel choice studies worldwide. The survey form is designed to collect information about attitudes and personal factors related to school trips. We are also working to collect data on other important factors such as distance from school to home and route characteristics. **(N. Singh, 2018)**

The basic data requirements and other relevant information were initially drawn from the literature and later modified to suit the Indian scenario. Also included was information on ways to travel from home to school and from school to home. Personal data (e.g. age, gender, and residence), household information (e.g. number of family members, parental employment status, monthly household income, and vehicle ownership,) and attitudinal information (e.g. perception of motor vehicles and active commuting) were included in the questionnaire. Because schoolchildren could not correctly estimate the travel time (Murakami and Wagner, 1999; Tetali et al., 2015) Information on household accompaniment can be obtained from the primary data source. The school district is an important factor related to the construction environment. If the school address and the student's residence are in the same county, the student may be considered a resident of that county. Life in a district is somewhat of a relatively short commute to school. The distance to the nearest bus/subway station is a measure of public transit accessibility. The number of intersections in the student safety route can reflect the active mode environment. **(R Zhang et al., 2017)**

A home-to-school trip made between 06:00 and 09:30 by an 11-year-old (i.e., presumably in 5th/6th grade) was analyzed. Data for younger children were not available and older children/adolescents were excluded because of the expectation that children's commuting behavior may change as they progress to secondary or tertiary school (R. Mitra et al., 2014). Previous research has identified an association

between mothers' travel patterns and their children's school trips. (McDonald et al., 2008)

Data for this study were collected through a softGIS survey for children where respondents used a web interface for marking their homes and daily routes to school and for answering questionnaires on school trips, perceived health and well-being and basic information. Method has been tested in previous research both in children (Kyttä et al., 2012; Broberg et al., 2013) and in adults. The user interface consisted of a set of alternating questionnaire pages conventional survey and mapping pages (see Fig. 1). Furthermore, the respondents were asked to mark places that were functionally, emotionally or socially significant and describe how these places were available in terms of independent mobility and active transport.

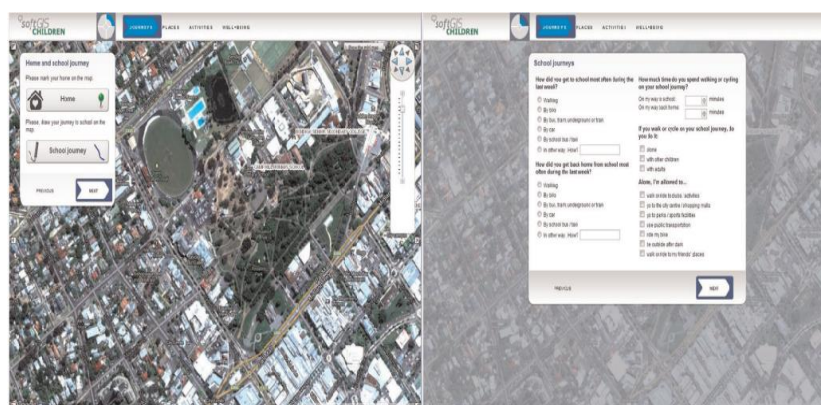


Figure 1. Interfaces for mapping and ordinary questionnaire pages.
(Source: A.Broberg and S.Sarjala.,2015)

Parents' attitude towards walking was measured using a validated instrument (Mehdizadeh, Mamdoohi and Nordfjaern 2017; Transport for London 2011). This includes statements like “Walking is an interesting way to travel”, “I don't feel safe walking alone my neighborhood” and “I like to walk where there are well-maintained sidewalks.” Respondent were asked to rate their level of agreement with each statement on a five-point Likert scale ranging from (1): strongly disagree to (5): strongly agree. Previous work has shown that this measure it was divided into three components called "comfort and walking comfort", "pedestrian design".Feasibility' and 'contextual and design assumptions for walking' (Mehdizadeh et al. 2016).

Parents' attitude towards traffic safety was measured using a 21-item instrument that was verified in previous research (Rundmo et al. 2011). The measure includes a statement

reflecting respondents' attitudes towards traffic safety, such as "I feel a personal responsibility for the safety of others in traffic" and "I have a good knowledge of public transport security." Respondents were asked to rate their level of agreement with each statement on a five-point Likert scale ranging from (1): strongly disagree to (5): strongly agree. Previous studies demonstrated a three-factor structure of this measure called "personal responsibility," "security." versus efficiency priorities' and 'security awareness' (Mehdizadeh et al. 2017; Rundmo et al. 2011). A revised 11-item version of a widely validated and tested instrument was used for measurement transport priorities (Nordfjærn and Rundmo 2015; Şimşekoğlu, Nordfjærn and Rundmo 2015). Parents were asked to indicate the level of importance they attached to various aspects of transport, such as "safety against accidents", "security against theft", "good accessibility for the given mode of transport" (short distance)', 'punctuality (little or no cancellations and delays)' and 'travel costs' when choose the mode of travel to school on a five-point Likert scale: Not at all important to Very Important. Previous studies have demonstrated the three-component structure of this so-called measure "priorities of convenience and accessibility", "priorities of safety and security" and "speed and cost". priorities' (Şimşekoğlu, Nordfjærn and Rundmo 2015; Mehdizadeh et al. 2017). Next descriptive statistics of the background variables in this study are shown in Table-1. Table-2 shows the means and standard deviations for the attitude and priority element..

Many methodologies, including standard ones, have been used to study children's usage patterns comparison of percentages and means, binary logistic regression (Henne et al., 2014; Stone et al. al., 2014; Waygood and Susilo, 2015; Larsen et al., 2016; Hatamzadeh et al., 2017; Mehdizadeh et al., 2017), multinomial logit regression (van Goeverden and de Boer, 2013; Helbich, 2017; Zhang et al., 2017, with decision trees beforehand, see He and Giuliano, 2011 for joint mode and entourage modelling), mixed logit regression that accounts for repeated choices (Noland et al., 2012) and structural equation modeling (Guliani et al., 2015; Susilo and Liu, 2016; Stark et al., 2018). The most common method is binary or multinomial logistic regression which accounts for the categorical nature of the mode selection information.

2.4 Summary

From the literature review, the model selected for the study is Multinomial logistic regression model. The study included the factors like environmental conditions, sidewalks etc. These factors were not considered in the above studies. In India, only few studies have been done based on school trips.

Chapter 3

METHODOLOGY

3.1 General

The methodology conducted in the study is shown in the form of a flowchart.

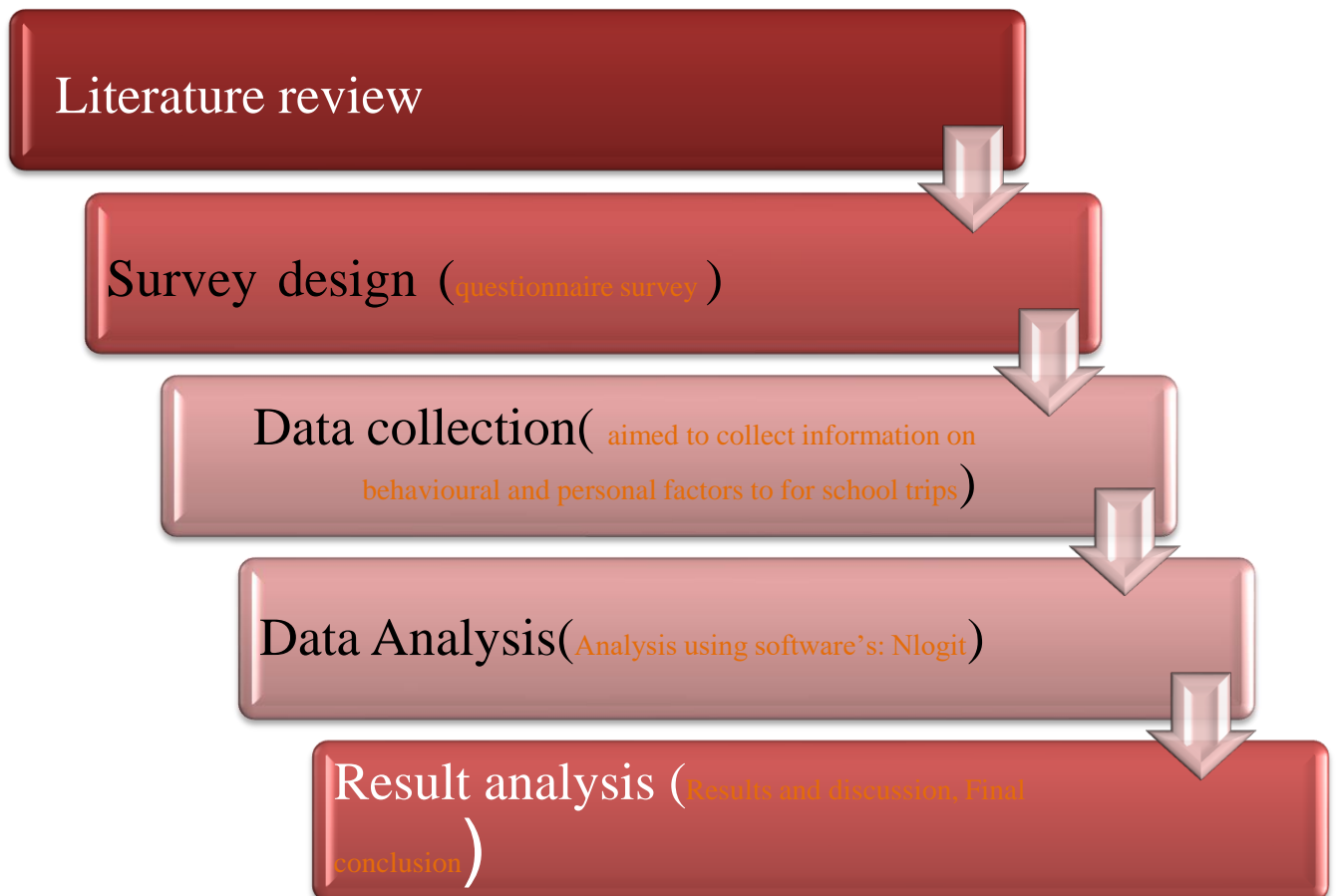


Figure 2. Methodology

3.2 Site Selection

The site selected for the pilot study was Karicode TKMCPS school.



Figure 3. Students at the selected school



Figure 4. School buses available at the selected school

3.3 Identification of Factors

The factors can be identified from the following methods.

3.3.1 Literature Reviews

One of the main objectives in this study is finding factors which makes people reluctant to use school bus services. Some of the factors were identified from the literature.

3.3.2 Pilot study

The pilot study was conducted to identify the factors which makes people reluctant to use school bus services. The study was conducted at TKMCPS at Karicode, Kollam. Total 54 data were collected, after quality check 50 data were suitable for analysis including 25 females and 25 males. Most of them (56%) were in the age of 10-15 years.

3. Household size (Family members)

50 responses

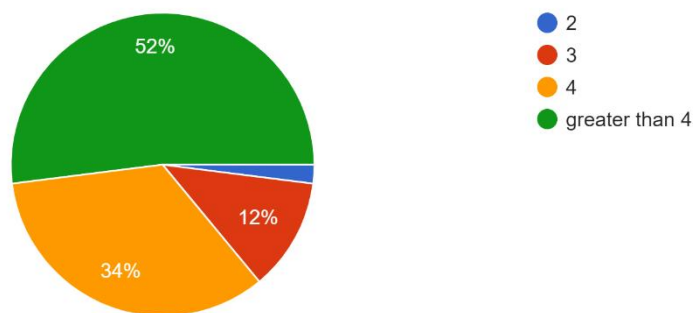


Figure 5. Pie chart showing the household size of respondents

From the bar chart it was clear that 52% have family members of greater than 4. So, there is somewhat higher probability for choosing family vehicles. If there were old age people there is also chances for accompanying childrens for their school trips.

4. Distance from home to school

50 responses

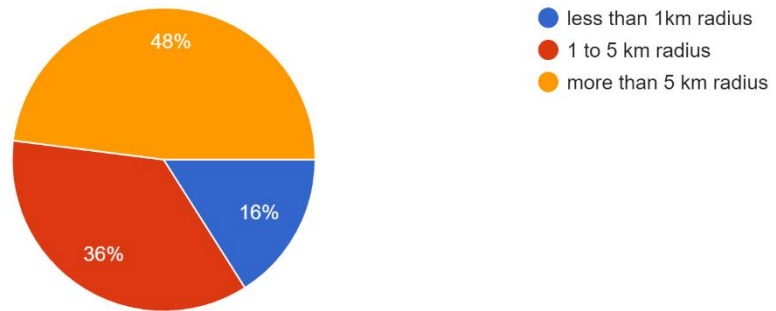


Figure 6. Proportion of distance from home to school

It was clear that majority (48%) of respondents are from a distance more than 5km radius. As distance increases the proportion of using school bus services or family vehicles may be more.

6. Household Income (monthly)

50 responses

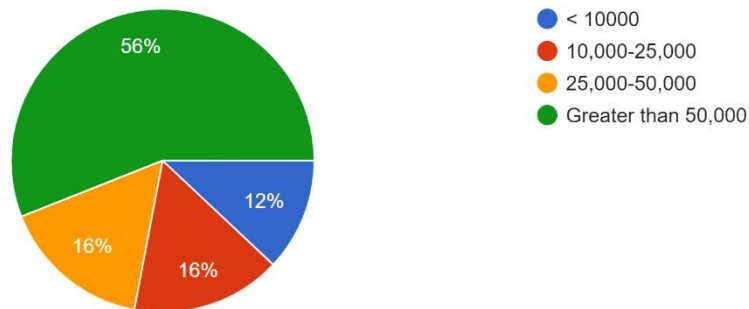


Figure 7. Pie chart showing household monthly income of the respondents

From the interpretation of the pie chart it was clear that about 56% respondents have monthly income greater than Rs50,000/-. As income increases there is high chance for the escorting the students and more concern is given for the childrens safety comfort etc.

7.a.Mention the type of vehicle (Eg: car,bike,auto etc...)

44 responses

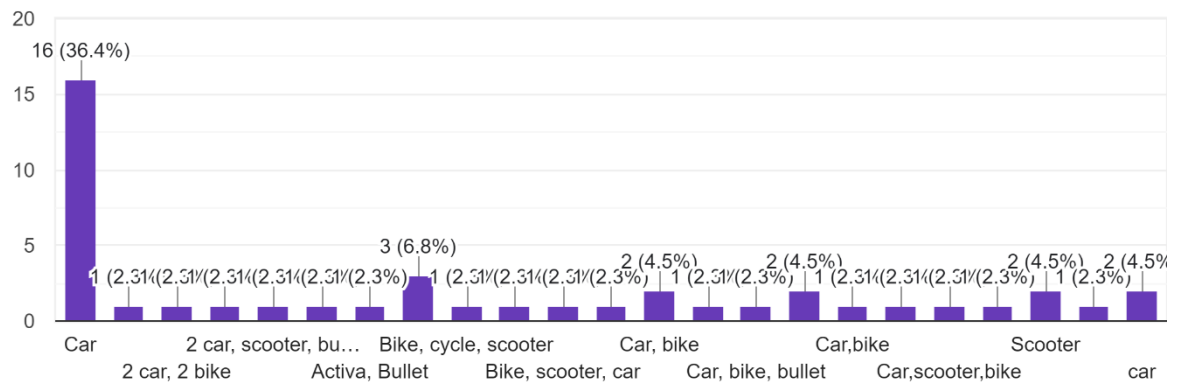


Figure 8. Identification of type of vehicle respondents have

From the the graph it was clear that majority of repondents have car ownership.As carownership increases there may be more chance for excorting the students by the parents even during rainy days.

9.Do you prefer school bus

50 responses

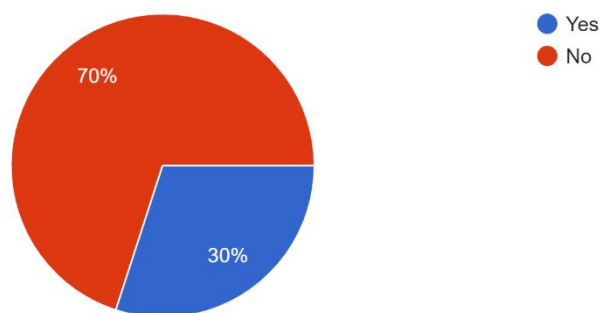


Figure 9. School bus preferences

From the analysis it was clear that 70% of the respondents do not prefer school bus service as their travel mode of school trip purpose.

9.b.what are the other modes you prefer other than school bus (More than one can be selected)

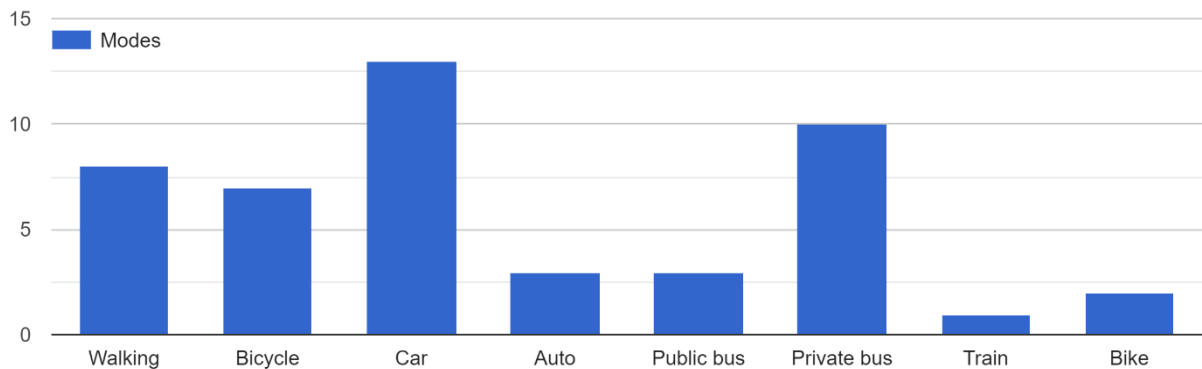


Figure 10. Graph showing the type of vehicle repondents are preferring for school trip

From the graph it was evident that majority of respondents prefer car and the reasons for choosing that they are pointing out about the convenience, comfort and safety than school bus. Second most one they are preferring is the private bus. Third most they are preferring walking and bicycling and those are mostly prefer by the childerns living less than 1km radius.

10.Reason for choosing school bus service

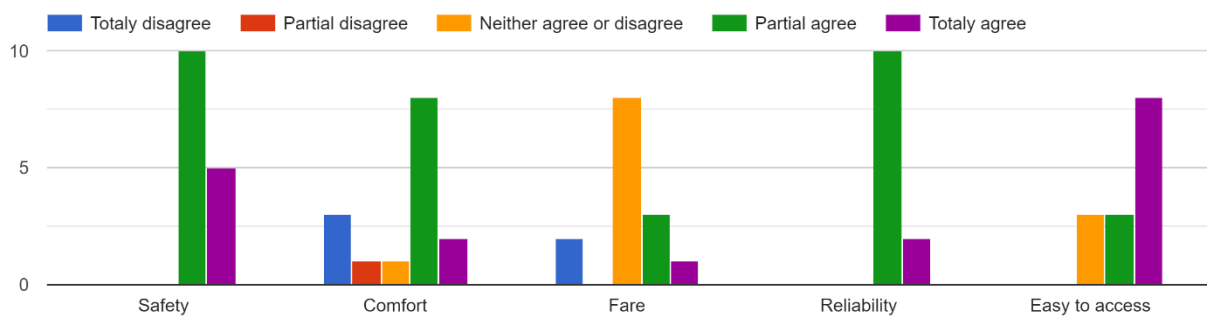


Figure 11. Reasons identified from those children who prefer school bus

From the graph it was clear that safety, reliability, comfort and easy access of the school buses are more preferring for their school bus service. v

3.3.3 List of attributes

(i) Socio-demographics

- Age
- Gender
- Travel distance
- Living status
- Household income
- Vehicle ownership

(ii) Household activity-travel interactions and behavior

- Same school
- Different school
- No adult available
- Average work distance of parents

(iii) Neighbourhood built environment

- Intersections
- Block density
- Safety
- Environmental impacts

(iv) Other

- Transit access
- Weather conditions
- Travel time
- Travel cost

3.4 Data Collection

The data collection for the pilot study was done through field questionnaire survey. The questionnaire was divided into different sections. The sections includes Socio- Economic characteristics such as age, gender, trip purpose, occupation, out of which different sub questions are also added to find out some of the factors which is essential for the study. Some of the section consist of short answer type questions which was aimed to identify the factors for the reason of preferring and not preferring the school bus services. Lastly suggestions of the respondents were also included. The questions were translated to respondents native language such that it helps them easier to understand and by helps to reduce errors while filling. A total 50 data's was collected from the above mentioned school. The collected data was used to find the factors responsible for not preferring and preferring school bus as their mode for school trip purpose.

3.5 Data analysis

The data analysis has to be done through logistic regression model in order to identify the significant variables predicting the non-usage of footbridge. In addition, logistic regression model has to be done to predict the change in usage of footover bridge after applying interventions among the non-users.

Chapter 4

CONCLUSIONS

Educational institutions are considered major tourist attractions. They play an important role for sustainable transport. However, studies on students' choice of schooling are very limited, especially in developing countries such as India. Understanding student travel patterns. It can help improve policies, programs and road infrastructure that aim to promote structured modes of transport such as public transport, school buses, walking or cycling. Reducing the use of private vehicles can reduce congestion levels and environmental impacts. The results of a pilot study show that travel time, gender, school location, living status, family income, boat ownership, distance, fares are all important factors influencing mode choice transportation by students. In order to encourage and attract the majority of students to switch to public transport and school bus services, the priority should be to expand the inner city bus network that connects the residential area with public transport. Also, the quality of buses needs to be improved to make passengers feel comfortable.

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APPENDIX

EVALUATION OF MODE CHOICE BEHAVIOUR AMONG STUDENTS FOR SCHOOL BASED TRIPS- A CASE STUDY FOR KOLLAM CITY

Questionnaire for identifying children's attitude towards different modes for school trip purpose

Dear Respondent,

I am a student of TKM College of Engineering currently doing M-Tech in Transportation Engineering, conducting this questionnaire survey for my project work on travel behaviour of school trip at school areas. I will be thankful to you if you spend a part of your precious time for filling this questionnaire. Your response will be kept confidential and used only for academic purpose

1. Gender

- Male
- Female

2. Age

- Between 4 to 10
- Between 10 to 15
- Between 15 to 18

3. Household size (Family members)

- Less than 1km radius
- 1 to 5 km radius
- More than 5km radius

4. Distance from home to school

- Less than 1km radius
- 1 to 5km radius
- More than 5km radius

5. Are your parents working

- Yes

- No

Based on question 5

5.a.Mention which sector are they working

- Public
- Private
- Others

Income details

6.Household Income (monthly)

- <10000
- 10000-25000
- 25000-50000
- Greater than 50000

7.Is there any vehicle at your home

- Yes
- No

Based on question 7

7.a.Mention the type of vehicle (Eg: Car,bike,auto,etc...)

Mode choice

9.Do you prefer school bus

- Yes
- No

Reason for not choosing school bus

9.b.What are the other modes you prefer other than school bus (More than one can be selected)

	Modes
Walking	<input type="radio"/>
Bicycle	<input type="radio"/>
Car	<input type="radio"/>

- Van
- Auto
- Public bus
- Private bus
- Train
- Bike
- Others

9.a.Mention the reason why you don't prefer school bus

9.c.Why do you choose the above mentioned mode

A Reason for choosing school bus

10.Reason for choosing school bus service

	TD	PD	NA nor DA	PA	TA
Safety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comfort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reliability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easy to access	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10.a. If there are any other factors (except "safety,comfort,fare,reliability,easy to access) mention them
