Sri Lanka Society of Transport and Logistics

Journal of South Asian Logistics and Transport
Volume 4 Issue 1 March 2024
JSALT 4.1.4: pp. 69-95
DOI: https://doi.org/10.4038/jsalt.v4i1.88

DETERMINANTS, MOTIVATORS AND BARRIERS FOR UTILITARIAN CYCLING IN STARTER CITIES: CASE OF BATTARAMULLA, SRI LANKA

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ABSTRACT

In the 1960s, a counter-cultural movement promoting utilitarian bicycle usage emerged in Europe and North America, challenging the dominance of cars, and advocating for sustainable urban mobility. despite the emergence of this movement, many developing cities have low cycling modal share and encounter obstacles in promoting utilitarian cycling. This study delves into workers attitudes toward using bicycles as an alternative mode of transportation. Employing a Binary logistic regression model and incorporating the Relative Importance Index (RII), the research identifies key determinants of utilitarian cycling. The findings highlight significant community willingness (71%) to bike to work, despite perceived barriers. Safety concerns (RII - 0.88) and environmental factors (RII = 0.60), such as rain and heat, emerge as prominent deterrents. Societal perceptions linking cycling to lower social status (vanity) (RII = 0.35), bicycle affordability (RII = 0.35), and work-related factors (RII = 0.48), such as non-cycle-friendly work attire and insufficient office parking safety, play relatively minor roles in discouraging bicycle use. Using the logistic regression model, the study predicts factors influencing the willingness to use bicycles for utilitarian transportation, revealing negative impacts from the absence of cycling infrastructure, motor traffic, rainy weather, and a lack of a cycling community.

***Keywords*:** *Starter, Cities, Utilitarian, Cycling, Attitude, Sustainability*

1. INTRODUCTION

The open economy in 1978 made drastic changes to Sri Lanka's transport sector. In the first instance, motor vehicle imports rose significantly from less than 300,000 units in 1977 to approximately 3 million units in 2011, averaging a growth rate of 8%. This was despite high rates of taxation on motor vehicle imports. [1] Due to the increase in motorised vehicles Colombo city experienced issues including traffic congestion, increased air and noise pollution, road fatality and accidents, and disorganised parking. Many developed countries experience these urban problems and promote Non-Motorised Transportation (NMT) policies as a means of overcoming them. NMT includes mainly walking and cycling. A comfortable cycling trip can vary between 2km to 7km, and it could cover most trips in an urban context [2]. According to the concept of the 'Green Transportation Pyramid,' cycling is considered the best option to promote sustainable transportation along with walking [3]

Although cycling has been a popular transportation method in European and North American cities for the past decade, the number of bike-share trips in other major cities has also rapidly increased. The most significant growth in cycling was apparent in 'cities where cycling was not considered a main mode of transportation[4]. Accordingly, successful public bike-share programs and innovative NMT strategies have been established in Asian countries such as Indonesia, Taiwan, India, and Hong Kong in recent years [5].

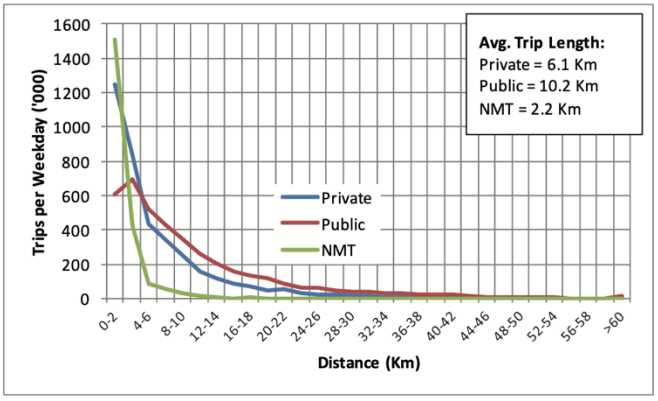


Figure 1: Distribution of Trips by mode by Travel Distance in Colombo

Source: [6]

However, the starter cycling cities have a limited cycling mode share of less than 10% with relatively few daily cycling trips and a car-prioritised urban design [7]. Since cycling infrastructure is not promoted in starter cities, many people do not use cycling

for transportation. As a result, actual demand for cycling remains unknown. Sri Lanka has had historical ties with cycling, but the rapid use of motorised vehicles and infrastructure improvements for such vehicles have overlooked the cycling promotion needs and opportunities.

There are more recreation-oriented cycling tracks in the Colombo area than designated cycling routes, thereby making it a starter cycling city. Hence the questions remain: how can cycling be promoted in starter cities? What attitudes do people have toward cycling as a daily transportation mode? What are the challenges and motivators for promoting such modes?

In the Western Province, 19% of trips are destined for work, with an average trip length of 10 kilometres [8]. Remarkably, the average distance travelled using a private motor vehicle is 6.1 kilometres (Figure 1), aligning closely with the comfortable cyclable distance of 7 kilometres [9]. Additionally, non-motorized transportation (NMT) still accounts for 21.5% of the vehicle fleet in the Western Province, indicating its continued relevance within the community and its potential viability as a transportation option in the Colombo area. Despite these indicators, there has been a notable absence of research focusing on understanding perceptions regarding the promotion of utilitarian cycling in Colombo [7]. Sri Lanka has limited promotion of cycling and a decreasing community use of utilitarian cycling. Because of this, although the importance of cycling is widely accepted, it is unclear whether there is an interest in cycling and what barriers to cycling prevail at present. It is also unclear whether there are means of motivating current non-users to adopt cycling. Hence, this research aims to recognise the perception of utilitarian cycling where the objective of the research is to identify, key perceived barriers, and motivators that affect the willingness to cycle to work.

2. LITERATURE REVIEW

According to [10], the promotion of bicycles is closely tied to sustainable transportation planning approaches. Recently developed concepts, such as micro-mobility and 15-minute cities, underscore the significance of cycling as a crucial element in sustainable mobility models [11], [12] These innovative planning approaches emphasise the evolving sustainability movement and the necessity for cities to adopt measures that challenge traditional transport planning issues, with a focus on unconventional transportation modes such as cycling.

However, translating these concepts into reality requires a thorough understanding of people's perspectives and motivations to transition towards sustainable transportation options. The perception of cycling aligns with the objectives of this paper, and it

necessitates the consideration of behavioural change theories. Theories such as Social Practice Theory (SPT), the Theory of Planned Behaviour (TPB), and Maslow's Transport Hierarchy of Needs form the foundation for understanding behavioural and physiological transport models [13]. One of the latest theories in identifying transport behaviour is Maslow's Transport Hierarchy of Needs, an extension of **Maslow's Hierarchy of Needs.** Similar to the hierarchy of needs, the fulfilment of lower-level requirements tends to escalate the need for others.

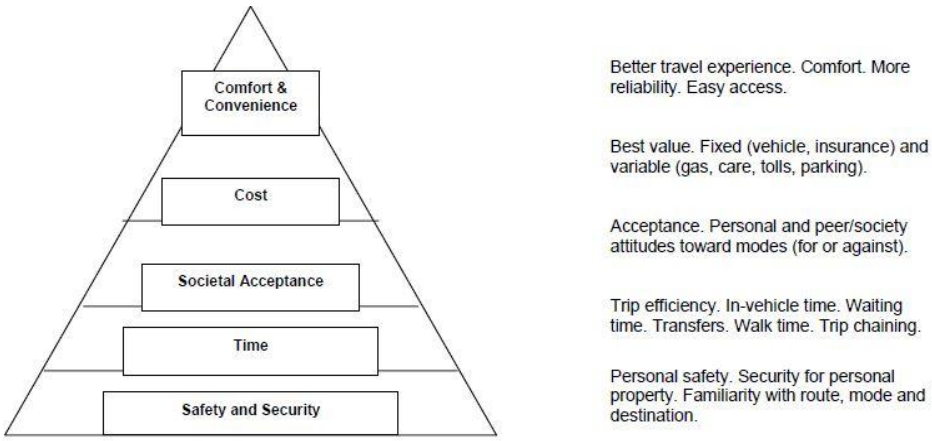


Figure 2: Maslow's Hierarchy of Transport Needs

Source: [6]

The understanding of physiological and behavioural transport models is that cycling is influenced by internal (**socio-cultural, physiological**) and external (**built environment, natural, policies, and marketing mechanisms**) factors. The ultimate assumption here is that these factors are perceived differently by different users, thereby creating barriers and motivators unique to individuals [15]. Accordingly, the perception of different types of barriers may change over time and be substituted by positive outcomes. This study aims to examine the existing deterrents and expectations of cycling. This may help understand the underlying ideologies toward cycling in the urban Sri Lankan context and improve the NMT mode share.

2.1. Determinants of Willingness to Bike

Cycling levels are usually affected by national and subnational policies [14]. For example, bike sharing (also known as "bike hire") was initially designed and pioneered in Europe and these systems have been widely spread across different parts of the world as a business model and a set of a policy. According to [15] many parts of Europe are currently undergoing widespread adoption of new biking systems, accompanied by more comprehensive land-use policies that promote cycling. These

policies include initiatives as establishing no-vehicle zones, pedestrian zones, and park-and-bike programs. In North America, the adoption process is in its early stages but gaining momentum. There are indications of the increasing influence of entrepreneurs in North America, particularly in terms of technology and business models. Moreover, evidence suggests that policy adoption processes in these regions have been influenced by successful systems in cities such as Paris, Lyon, Montreal, and Washington, DC, and many of the countries in the global south still lack its influence [16].

To achieve a sustainable cycling practice in a country, it is vital to determine the factors affecting bicycle use [17]. Much research has been developed on how the use of bicycles has been favoured by travellers[18]. The author delineates four main categories influencing the choice of bicycles as a primary commuting mode: built environment, natural environment, socioeconomic factors, and psychological factors [17].Other studies corroborate these indicators, highlighting socioeconomic background, gender, age, income, fitness level, and vehicle ownership (car/bicycle) as significant determinants of travellers' preferences [18], [19], [20]. Personal preferences and social status are also linked to cycling usage: when cycling is perceived as a poor man's transportation mode it makes implementing NMT policies look risky to the rich who have decision-making power [19].

Studies conducted in American contexts found that highly educated white males were more likely to use cycling as a transportation mode [20] and that promoting cycling in neighbourhoods had gentrified those areas and has resulted in racial conflicts between people of colour and whites [21] In contrast, D.J. Benedini, who conducted a study in the Brazilian context, identified that "younger adults" with lower income and education were more interested in using bicycles for transportation [22] Therefore the socio-cultural attitude toward cycling can be considered as a context-specific factor. Travel speed, safety, and distance are base-level factors that influence travel choice where cyclists are less likely to take bicycle trips for longer distances [23], [24], [25]As opposed to this view, a 2006 Minneapolis study shows that 83% of the time, cyclists will choose a longer route if provided with bike routes and were willing to add 20 minutes onto their trip for cycling. Therefore, depending on the context, the journey purpose and distances could act as motivators or barriers to cycling use[26].

Weather and temperature also determine bike use where human-oriented transport modes tend to be affected more by the natural environment [27]. According to [28]weather affects recreational bike use more than it impacts commuting purposes. According to [29], it was found that topography was considered a significant barrier

to cycling promotion. Nevertheless, it is observed that the natural environment's significance on bicycle use patterns varies.

It was also identified that urban form and physical environment affect bike use where mixed-use, high-density areas which are scenic tend to have higher bike usage due to the impact of beautification on perceived level of comfort and convenience. Constructing bicycle lanes that are separated from other transport modes, networked to one another, have parking facilities and intersection handling motivate people to cycle more in cities; as does the prevalence of public and private bike-share programs[30], [31]

2.2. Recent studies on cycling in Sri Lanka

In the Sri Lankan context, there has been not much cycling-related research because cycling has not been promoted as a transport system, despite the Road Development Authority's few attempts to establish cycling routes in Suburban areas. Out of the two studies that have been carried out, a study based on Katubadda- Piliyandala cycling route identified barriers to cycling including design issues related to the cycling path where the non-connectivity of the cycling route, route being blocked by other vehicles, and other motor vehicles using the cycling path for transportation. [32]

Another study of the Malabe-Kaduwela cycling route identified the issues related to cycling road design and some of the preferences of different potential user groups in Malabe for cycling promotion, which identified school children and university students as being more likely to consider cycling. This proposed bicycle promotion in contexts such as universities and schools. [32]

Previous studies could not identify planning issues for promoting cycling in Sri Lankan urban context, where under what conditions the modal transportation shift could be a success or why cycling promotion in Sri Lanka is lagging. However, sustainability is widely discussed in the planning process; therefore, it is essential to identify cycling barriers to plan better infrastructure.

3. METHODOLOGY

A general questionnaire survey was created to identify the community interest and perceived barriers and motivators to cycling. Additionally, a pilot survey was conducted using 20 participants to identify any issues in questionnaire design. The research process followed is mentioned below.

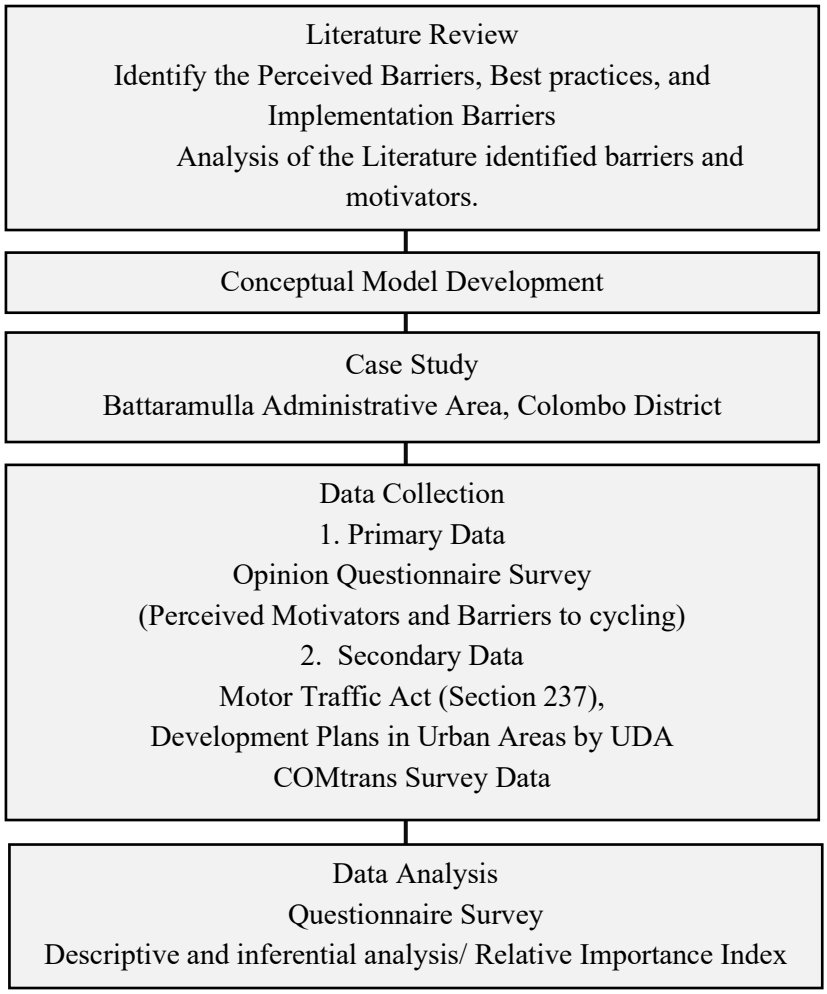


Figure 3: Methodology Source: Author

3.1 Case Study - Battaramulla Administrative Area

The Urban Development Authority has initiated planning for a cycling network connecting the Colombo Metropolitan area and Battaramulla area. This project aims to create a healthy community and ease the Colombo-Battaramulla traffic congestion by shifting the focus towards NMT among four user groups: the working community, students, tourists, and the health-conscious crowd of Colombo.

Research data collection was confined to the Battaramulla area rather than encompassing other cities in Colombo for several reasons. In the present context, the highest peak-hour vehicle traffic and the highest private vehicle operating corridor is the Malabe - Battaramulla area, where promoting a sustainable alternative is needed. [33]

Moreover, Battaramulla is also a destination for employees of government offices, one of the key target groups under the cycling infrastructure promotion project identified by the UDA (Urban Development Authority).

The area also occupies pro-cycling conditions such as high density-built environment (according to [34] having a higher density is a favourable cycling condition). It also consists of green areas, waterfronts, and flat terrain that encourages cycling behaviour, especially in humid conditions[35].

While the cycling trend in the Battaramulla area has seen a decline, it historically stood as the second-highest bicycle commuter route, making it an ideal location to investigate both the barriers and motivating factors. In 2004, Parliament Road in Battaramulla accounted for 1,347 bicycles, ranking as the second-highest bicycle occupant route, trailing only behind the Urugodawatte-Ambatale road. However, by 2016, Colombo's bicycle usage declined [1]. Additionally, Battaramulla has the target population and environmental factors required by this research and lends itself to a study of perceived motivators and barriers for people to cycle to work.

3.2 Sampling and Data Analysis

The sample selection for the questionnaire survey followed random sampling, with only residents and commuters employed in Battaramulla area being considered for the research. This was because the aim of the research is to identify the barriers and motivators for using cycling as a daily commuter mode for working. The conditions needed to qualify to take part in the questionnaire were:

- To reside within a comfortable cycling distance (7Km) of the workplace or,
- To be a commuter using public transportation who takes a stop within a 7km radius from the workplace.

The sample consisted of 200 adults who are economically active within governmental and private sectors aged 18 – 60. Analysis of data was followed by the mixed approach where quantitative and qualitative analyses was done using:

- Descriptive Statistics – for a general description of the data
- Relative Importance Index – to rank the importance of factors.

Relative Importance Index – According to [36] RII is to assess the significance of one factor in relation to the other factors mentioned. The formula used for calculating the RII was,

$$RII = \frac{\sum W}{A*N} \quad \text{..... (1)}$$

Where,

W—weighting given to each statement by the respondents and ranges from 1 *to* 5;

A—Higher response integer (5); *and*

N—total number of respondents.

It produces a value ranging between 0 - 1.0 [37] where values closer to 1.00 have greater relative importance. The Relative Importance Index (RII) was calculated using a Likert scale in the questionnaire. Respondents rated motivators and barriers on a scale from 1 to 5, where 1 indicated lower relevance and 5 signified the highest relevance based on individual preferences. The questionnaire survey is provided in the appendix for reference.

Along with the RII, The Inter Quarantine Range (IQR) and median have been provided for the analysis. They are essential metrics when analysing Likert scale survey data. The median offers a reliable measure of central tendency, resistant to outliers, while the IQR showcases the spread of responses within the middle 50% of the dataset. Together, they offer valuable insights into typical responses, variability, and opinion distribution, helping understand respondent perspectives and enabling fair comparisons to gauge diversity, skewness, asymmetry, and opinion spread.

3.1. Inferential Statistics – For making generalisations about the population. (Regression Modelling)

Logistic Regression equation

$$Ln\left[\frac{P}{1-P}\right] = \beta_{0+}\beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k \text{ ----------(2)}$$

Where P is probability, β is the estimated parameter and X are explanatory variable of the model.

3.3 Sample Overview

The onsite questionnaire survey included 200 participants from both government (46%) and private sectors (54%). The below table demonstrates the primary socioeconomic status of the sample.

Table 1: Sample Overview

Gender	
Male	60.5
Female	39.5
Employment Sector	
Government	46.0
Private	54.0
Self-Assessment of Income Status (Monthly in Sri Lankan Rupees (LKR))	
<40,000	46.5
40,000-80,000	42.5
>80,000	11.0
Education Level	
Less than (O/L)	20.5
Upto A/L	55.5
Higher Education	24.0
Home Location	
Resident	39.5
Commuter	60.5
Primary Commuter Mode to work	
Bus	47.0
Train	6.5
Car	19.5
Motorbike	13.0
Three wheel	4.0
Bicycle	4.0
Walking	6.0

The usage of bicycles among the community can be seen as little as 4% (n=8) as the primary transportation method, although the sample (n=200) consisted of an active community who resides/ commutes from the identified bikeable distance (7 km) to the workplaces.

4. RESULTS & DISCUSSION

4.1. Interest in Bicycle Use as a Transportation Mode

Table 2: Interest in Bike to Work

Category	Percentage %
Gender	
Male	75.2
Female	64.6
Self-Assessment of Income Status (Monthly in Sri Lankan Rupees (LKR)	
<40,000	84.04
40,000-80,000	53.3
>80,000	75.86
Education Level	
Less than (O/L)	95
Up to A/L	63.6
Higher Education	67.34
Home Location	
Resident	81.01
Commuter	64.46
Primary Commuter Mode to work	
Bus	76.92
Train	84.6
Car	67.5
Motorbike	42.9
Three-wheel	62.5
Walking	75

Based on gathered responses, 71% expressed interest in using bicycles as an alternative mode of transportation for work, while 85% indicated interest in using bicycles for various commercial activities. Reasons for hesitancy towards bicycle use included physical inability (3%), lack of cycling knowledge (1.5%), and job requirements favouring motorised transportation (2%), along with personal comfort and experiences related to cycling (1%). Those interested in cycling were motivated by health benefits (18%), cost advantages over other modes (16%), and environmental concerns (15%).

In summary, the community showed interest in utilitarian cycling, with potential user groups identified as males in the monthly income bracket of LKR 40,000 (84%) aged 25-30. Surprisingly, those in the higher income category of LKR 80,000+ (75%) also demonstrated significant interest, challenging the stereotype that cycling is preferred

by the poor. Nevertheless, it is important to acknowledge that despite concerns about social stigma, the study emphasises the importance of integrating cycling into planning processes for equitable transportation. This is particularly crucial given that 60.8% of the population in the Colombo district falls within the income category of less than LKR40,000, according to data from the ComTras survey [8]. Furthermore, this study indicates that cycling is highly favoured by this same group, with an impressive 84% finding it an attractive transportation method.

In terms of location preferences, residents of Battaramulla show a stronger inclination towards cycling to work compared to commuters who have a stop in Battaramulla. Respondents noted an average comfortable cycling distance of 3-5 kilometres, which is generally shorter than the 7-kilometer distance identified by international research. The tropical climate of the country might have influenced respondents' reluctance to consider a longer cycling distance.

Public transit users showed more interest in cycling than private vehicle users and, motorbike users were least interested in considering cycling as a transportation mode (43%), confirming that "NMT promotion can be tricky in a context with motorbikes and Paratransit in practice." [38]

4.2. Perceived Barriers and Motivators for Cycling for Work

Although interest in cycling exists, it is essential to identify the perceived barriers and motivators for cycling so that the barriers can be mitigated, and motivators can be encouraged to facilitate bicycle use.

4.2.1. Perceived Barriers to Cycling to Work

According to the Relative Importance Index (R.I.I.), the communities' most pressing barriers included safety concerns (0.83). Specifically, safety-related concerns are highlighted by mixing motorised vehicles and bicycles in the existing routes. (RII = 0.88, Mdn =5, IQR=1)

Natural environmental (0.60) conditions such as heat and rain, heat (R.I.I. = 0.59) is identified as a barrier for most respondents, and the outcome of the heat that is the perception of arriving sweating to work is also a barrier for respondents to cycle (R.I.I. = 0.64). However, it should be noted that the respondent's ideas related to natural conditions as a barrier for cycling are divided with no significant consensus among them. (Mdn=3, IQR=2)

From concerns related to current work and routine (0.43), The standard issue identified is that cycling was identified to be more time-consuming than the current mode (R.I.I. = 0.60), yet opinions seemed to be divided regarding this concern since

roughly an equal number of respondents claimed it not to be a barrier (40%, Mdn = 3, IQR = 4)

Table 3: Perceived Barriers

Barriers	%	Median	Interquartile Range	RII Score	Rank
Safety	**77.63**	**5**	**1**	**0.88**	**1**
Speed of other vehicles makes it unsuitable to cycle	84.5	5	1	**0.91**	
Motorists does not respect cyclists	82.5	5	1	**0.89**	
Not having sufficient infrastructure	78.5	5	1	**0.86**	
Current traffic in the city makes it unsafe to cycle	77	5	1	**0.87**	
It will take longer time to reach when cycling	35	3	4	**0.60**	
Natural Environment	**38.59**	**3**	**2**	**0.60**	**2**
It rains all the time	25	3	2	0.57	
Sweating	42	3	2	**0.64**	
Heat is unmanageable	38	3	2	0.59	
Work/ Routine	**23.41**	**1**	**1**	**0.48**	**3**
Carrying heavy/ larger things to work	3.5	1	0	0.25	
Work attire is not compatible	31	2	3	0.51	
Safe Parking is unavailable	31	2	2	0.54	
Bike Equipment	**22.95**	**1**	**1**	**0.41**	**4**
Do not Own a bike	51	4	4	**0.64**	
Carrying the bike is impossible	11.5	1	1	0.33	
Cannot Afford a bike	15.5	1	1	0.35	
No Bicycle repair shops available	7	1	1	0.33	
Phycological/ Physical	**19.32**	**1**	**0**	**0.35**	**5**
Stigma and Vanity related issues	11.5	1	2	0.35	
Not knowing how to cycle	5	1	0	0.26	
Have not cycled in years	20	1	2	0.38	
Physically unable to cycle	2	1	0	0.24	
Others not cycling in the city	33	3	3	0.50	

Additionally, access to bike equipment (0.41), and physiological and physical issues (0.35) showed significantly low relevance. Lack of bicycle access is a significant obstacle, with a Relative Importance Index (R.I.I.) of 0.64. While most respondents recognise it as essential, there is a notable split in perceptions. The "median" score of 4 signifies that half of the respondents rated this barrier higher, and half rated it lower. Additionally, the "Interquartile Range" (IQR) of 4 indicates that the middle 50% of responses fall within a range of 4 points around the median, showing variability in how respondents perceive this barrier.

Even though it's assumed that physiological and social barriers are unique to Sri Lanka (R.I.I. = 0.35), only 12% of respondents considered vanity and prestige as barriers.

Overall, in terms of perceived barriers to cycling, safety was the main barrier. (77%). According to the theory of transit hierarchy of needs, the minimum requirement that needs to be fulfilled for one to prefer a transportation method is safety, yet it appears that this basic requirement is compromised in the current transportation system.

According to the transit hierarchy of needs, the second-level requirement is time efficiency. However, opinions on the time constraints of cycling vary. While the Relative Importance Index (RII) score is relatively high at 0.60, the median response of 3 and the Interquartile Range (IQR) of 4 suggest differing opinions among respondents. There appears to be moderate concern about the extended time required for cycling compared to other transportation modes. This variation could stem from factors such as respondents being located within a comfortable cyclable distance to workspaces or issues in the current public transportation system causing delays due to traffic congestion in the Colombo area.[39]

Social acceptance related to cycling is perceived as the least impactful barrier, with psychological and physical barriers also lacking significant importance (RII = 0.35). However, the lack of a cycling culture supported by others seems to have a higher RII score within the barrier group (RII = 0.50), aligning with the theoretical explanation of social acceptance being a significant factor in transportation decision-making. Regarding affordability or price concerns, there is consensus among participants that it is less of an impactful issue.

These findings underscore the complex interplay of factors influencing transportation choices and highlight the need for comprehensive strategies to promote cycling as a viable mode of transport.[34]

4.2.2. Perceived Motivators for Cycling to Work

Table 4: Perceived Motivators

Motivators for Cycling	RII Score	Percentage	Median	IQR
Cycle tracks separated from current road network	**0.92**	92.5	5	0
Shaded roads with green cover	**0.90**	90	5	2
Promotion of ebikes	**0.85**	81	5	1
Cycle tracks on road separated with physical barriers	**0.78**	76	4	1
Cycling networks connecting bus stops/ railways and workplaces	**0.78**	71.5	4.5	2
End User Facilities E.g. Showers	**0.75**	69.5	5	2
Promotion of helmet requirement for cycling	**0.75**	68	4	2
Bicycle rental facilities	**0.75**	66	4	2
Cycling Promotion Campaigns	**0.68**	59	4	3
Incentives to buy a bicycle	**0.67**	53.5	4	3
Cycling training lessons at work	**0.37**	31.5	1	4
Cycling tracks on road with speed limitations on other vehicles	**0.55**	27.5	3	2

Since the interest and barriers were identified, it is also vital to understand preferred measures of promoting cycling as reported by users. Below are the identified most effective measures for bicycle promotion, according to respondents.

The most impactful motivator for promoting cycling is the presence of physically separated cycling tracks, with a Relative Importance Index (R.I.I.) of 0.92, indicating strong agreement among respondents (92.5%) and a median score of 5 with no variability around the median. Social Practice Theory (SPT) recognises the material dimension of habits, emphasising the necessity of having physical resources to facilitate the development of a practice. In the context of cycling, physical infrastructure serves as a positive catalyst for motivating behaviour, illustrating how material elements play a crucial role in shaping and reinforcing practices where physical infrastructure (R.I.I. =0.92), shaded roads (R.I.I. = 0.90), bike rental facilities (R.I.I. = 0.75) and e-bike promotion (R.I.I. = 0.85) are highlighted as influencing motivators for cycling promotion. Green coverage, such as shaded roads with vegetation, is indeed a motivator for cycling, with a significantly high RII score of 0.90 where respondents considering it beneficial for biking. Although it is recommended as an effective measure to promote cycling in traffic-calmed areas in starter cities [40], this study reveals that it does not directly motivate people to choose

cycling, and only (27%) found it compelling. This measure has a Relative Importance Index (R.I.I.=0.55), indicating moderate agreement among respondents (27.5%), with a median score of 3 and an interquartile range (IQR of 2) showing the variability of the opinions.

Technology improvement for cycling is another consideration of participants where electric bike promotion was preferred as a motivator for cycling. 51% of the respondents raised the concern of not having access to bicycle facilities and therefore identified as a barrier for practicing cycling. As a solution to this issue, respondents have shown consensus to promote bicycle rental facilities (R.I.I. = 0.74) over incentives to buy bicycles (R.I.I. = 0.67), highlighting that the public is more preferred to have a bicycle-sharing system where less risk and storage are concerned with such systems.

4.3. Determinants of the willingness to bike to work

The logistic regression model aimed to identify factors influencing the willingness to use bicycles as a mode of transportation. Among the 20 identified barriers, similar ones were grouped under considerations of safety, natural elements, work routine, bike equipment, and psychological factors. Only the barriers demonstrating statistical significance were incorporated into the model to enhance its fit. The remaining factors within these groups were excluded to minimise noise. Nevertheless, an effort was made to incorporate factors from these groups, even if lacking statistical significance, aiming to preserve their representation in the model. Therefore, key factors included road safety, infrastructure availability, bike accessibility, weather conditions (specifically rain), education level, and societal stigma. In the process, non-significant variables were systematically excluded, creating a refined model where all remaining variables were statistically significant.

This final model was then compared to a comprehensive model containing all variables to assess goodness of fit. The comparison involved using AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion) to find the right equilibrium between model fit and simplicity. Model featuring a reduced set of variables, demonstrated lower AIC (154.406) and BIC (187.389) values compared to the model encompassing all variables (AIC: 166.154, BIC: 255.209). The preference for the selected model underscores its superior balance between explanatory power and model simplicity.

The fitted model has a chi-square value of 69.23 (P-value =0.00). The model explained from 29% - 44%. (Nagelkerke R^2) of the variance of factors affecting the willingness to bike to work correctly and classified 84% of the cases.

The classification table (Table 5) serves as a comprehensive snapshot of the logistic regression model's predictive capabilities in determining willingness to bicycle. The observed and predicted values for both affirmative (Yes) and negative (No) willingness categories are presented, allowing for an assessment of the model's accuracy. With 96.2% accuracy in predicting individuals willing to bicycle and 40.9% accuracy in predicting those unwilling, the model achieved an overall accuracy rate of 84.0%. The 0.500 cut value serves as the threshold for classifying individuals into the respective categories.

Table 5: Classification Table for Regression

Observed		Predicted		
		Willingness to Bicycle		Percentage Correct
		Yes	No	
Willingness to Bicycle	**Yes**	150	6	96.2
	No	26	18	40.9
Overall Percentage				84.0

Note: the cutoff value is .500

Table 6 below, shows the final fitted model of the regression analysis. Explanatory variables selected were: Two factors related to natural elements, one safety-related factor (unsafe cycling in current vehicle traffic), two factors related to bike infrastructure (bike availability and infrastructure), one work-related factor (work clothes), and two psychological factors (education and peer support) were incorporated into the model.

Table 6: Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Current Vehicle Traffic makes it Unsafe to bike	-.537	.170	9.957	1	.002	.585
Unavailability of Infrastructure	-.354	.171	4.303	1	.038	.702
Rainy Weather	-.412	.199	4.283	1	.038	.662
Education Level	.653	.393	2.763	1	.096	1.921
Bike availability	.858	.464	3.411	1	.065	2.358
Hot weather	.336	.210	2.560	1	.110	1.400
Not having peers who cycle	-.377	.171	4.882	1	.027	.686
Work Cloths Incompatibility	.211	.169	1.558	1	.212	1.235
Constant	-.419	1.217	.119	1	.731	.658

Note: Variable(s) entered on step 1: Traffic_Makes_Unsafe, Unavailable_Infra, Weather Rain, Edu Level, Cycle Available, Sweating, Others_Not_Cycling, Work Cloths.

The model examines various factors influencing the decision to bike. Noteworthy factors include the perceived unsafety of current traffic conditions, where statistical significance ($p = 0.002$) reveals a negative association (Exp(B) = (-0.585). This suggests that individuals in areas with unsafe traffic are less willing to bike, with the odds decreasing by approximately 41.5% for each unit increase in perceived traffic unsafety. The unavailability of biking infrastructure also contributes significantly ($p = 0.038$, Exp(B) = 0.702), leading to reduced odds of cycling by about 29.8%. Rainy weather, noted for its statistical significance ($p = 0.038$, Exp(B) = 0.662), acts as a deterrent, lowering the odds of willingness to bike by approximately 33.8%. Lack of cycling peers ($p = 0.027$, Exp(B) = 0.686) decreases the odds by about 31.4%. Conversely, bike availability ($p = 0.065$, Exp(B) = 2.358) and hot weather ($p = 0.110$, Exp(B) = 1.400) show positive associations, increasing the odds of cycling by about 135.8% and 40.0%, respectively, for each unit increase.

Variables deemed non-significant, such as Education Level ($p = 0.096$) and Work Clothes Incompatibility ($p = 0.212$), lack substantial impact on the willingness to bike however does offer a positive relationship with the decision to cycle. The model's robust overall fit, as determined by the Wald chi-square test ($p < 0.001$), underscores the collective contribution of variables to a well-fitting model. Coefficients, whether negative (e.g., for traffic safety, infrastructure, and rainy weather) or positive (e.g., bike availability and hot weather), signify the corresponding decrease or increase in the odds of willingness to bike. Exp(B) values, providing odds ratios, offer a quantitative perspective. For instance, an Exp(B) of 0.585 for traffic safety implies that a one-unit increase in unsafe traffic corresponds to a 41.5% decrease in the odds of willingness to bike. This detailed model carefully examines various factors that affect the decision to ride a bicycle, providing insights into different aspects.

In summary the study’s findings are that, although community's bicycle usage remains low, with only 4% using it as their primary transportation method, despite residing within a bikeable distance to workplaces, there is substantial interest in utilitarian cycling, with 71% considering it for work and 85% for other commercial activities. Motivations for cycling include health benefits, cost advantages, and environmental concerns. Interestingly, interest to cycle spans within various income brackets, challenging stereotypes. Residents favour biking to work within a 3-5 km distance conflicting with the popular finding that comfortable cycling distance is as 7 km however this may be a result of the tropical nature of the country which discourages the ability to cycle longer distances. The finding also shed light on promoting cycling as an alternative to the paratransit since according to [7] average distance travelled using a three-wheeler within city limits account to 4.1 Km which can be a potential opportunity to promote cycling especially since community also

encourages bike sharing programs as a method for promoting cycling. Additionally, it can also be seen that public transit users show more interest in cycling than private vehicle users. Motorbike users are the least inclined, highlighting challenges in promoting non-motorised transportation. In terms of the barriers similar to many starter cities safety concerns were the most significant barrier to cycling, especially due to the mixing of motorised vehicles and bicycles on existing routes.[41], [42], [43] and encourages promoting cycling away from current vehicle traffic. Additionally, some respondents felt that cycling was more time-consuming than their current mode of transportation, impacting their willingness to bike. Access to bike equipment, including not having a bicycle, was identified as another crucial barrier. While physiological and social-related barriers were considered less significant, vanity and prestige were not major concerns for most respondents which is also reflected in the regression analysis where higher education levels positively impact the decision to cycle. Overall, addressing safety issues, improving infrastructure, and providing access to bicycles could help overcome these barriers and promote cycling as a viable transportation option.

According to the logistic regression model findings generally align with similar studies conducted in different contexts. For instance, infrastructure with less separation between motor traffic and bicycle routes tends to decrease the inclination to bike [41], [42]. Both the regression results and literature studies indicate that education level influences cycling behaviour. The regression model shows a positive correlation between education level and the likelihood of cycling, while literature in developed countries suggests that highly educated individuals are more prone to use cycling as a mode of transportation [22] although the study is done in a developing country this result shows the growing attitude change towards cycling by the people in developing countries. Additionally, there is a discrepancy between literature studies and the regression results regarding the influence of travel distance and purpose on cycling behaviour. While the regression findings imply that longer distances may discourage cycling, literature suggests varying perspectives. Additionally, according to literature [29], weather conditions have a greater impact on recreational cycling than commuting purposes; however, rainy weather negatively affects the decision for commuter biking as well. Interestingly, although studies in Asian contexts suggest that hot weather has a negative impact, this study indicates that hot weather positively influences the decision to cycle, possibly because participants may have compared rainy and sunny weather conditions when making their cycling decisions [43].

5. CONCLUSION & RECOMMENDATIONS

This study identified the perceived expectations and barriers related to bicycle promotion. For most starter cities, promoting a cycling culture is a battle between institutional frameworks and people where in which, what should come forward. The constant doubt about if people are willing to accept cycling for transportation and their expectations are unknown leaving the gap between decision-making people and community. Therefore, this research has been able to identify that there is still a greater number of people who are interested in changing their transportation behaviour for more sustainable options given better conditions. It is also noticeable in starter cities that, the need for promoting cycling is overshadowed by the ideologies frequently mentioned that the community does not prefer bicycles due to the image of it being associated with a "poor man's transportation mode." On the contrary to, this research suggests that the safety for cyclists needs to be more discussed and ensured where only 11% claimed vanity as a related factor to not choosing biking. Therefore, more emphasis should be given to ensuring road safety for cyclists which is neglected at the institutional level of current practice, leading to decreased bicycle usage, according to this study. This research may have been able to identify the ways of thinking about cycling; therefore, it can be used when planning for promoting a bicycle culture in Starter cities.

5.1. Recommendations

5.1.1. Include cycling routes in the local level of planning

Since there was a significant interest in cycling to commercial activities among participants (88.5%), it can be encouraged by adding cycling routes in the local level plans so that bike networks can be evolved. Especially river and railway buffers could be converted into bike paths connecting other transport modes and city centres. Also, the current practice of allocating space for vehicles with a higher occupancy could be changed in local areas and have strong regulations to encourage NMT. A few suggestions would be to increase car parking charges, reduce the number of parking spaces, provide park-and-ride systems with bicycles, and operationalise bike lanes with fines for users encroaching bike lanes.

5.1.2. Change the existing model for promoting bicycle lanes on existing roads

The existing cycle paths demarcated by R.D.A. promote on-road cycle lanes in B' class roads with a minimum width of 1.5m [44]This could be changed to creating physical barricades between motor traffic and bikes as preferred by many (76%). It can also recommend using proper colouring to cycle paths that are pleasant to riders and form a distinct separation from motor traffic to ensure a sense of safety. Also, it

is needed to encourage green coverage for bike lanes as a construction requirement when planning whenever space exists.

5.1.3. Create Integrated Transportation Plans

It is also needed to take traffic counts and includes cycling as a transportation mode in the plans rather than as a standalone mode of transportation. Bicycles can be incorporated as a feeder to the public transportation system through integrated plans. Similar should be followed when planning for bike rental programs.

5.1.4. Arrange knowledge sessions/campaigns to include the importance of promoting NMT to overcome the stigma

This study was carried out to identify both perceived barriers and motivators for cycling and implementation barriers for cycling. The public and institutional attitudes toward cycling can be understood through this study, and the measures that other countries have promoted can be identified from a localized perspective.

5.2. Research Limitations

This research is built upon the empirical evidence reviewed and is based in the Colombo area, a tropical city with limited cyclist share. Although educational purposes and business purposes are also subject to commuter trips, only commuting to work has been considered in the study.

5.3. Acknowledgement

We would like to thank the University of Moratuwa for providing the necessary resources and facilities that facilitated the smooth execution of our research. Our gratitude extends to the participants who willingly dedicated their time and shared their insights, contributing significantly to the study's depth and breadth.

5.4. Funding Details

The authors received no financial support for the research, authorship, and/or publication of this article.

REFERENCES

[1] Kumarage. Amal S, “https://kumarage.files.wordpress.com/2015/03/2012-r-01-tp-kumarage-a-s-sri-lanka-transport-sector-policy-note-world-bank-111pp.pdf,” World Bank, Sri Lanka. Accessed: Nov. 30, 2023. [Online]. Available: https://kumarage.files.wordpress.com/2015/03/2012-r-01-tp-kumarage-a-s-sri-lanka-transport-sector-policy-note-world-bank-111pp.pdf

[2] "(1) Relations between organizational identity, identification and organizational objectives: An empirical study in municipalities." Accessed: Nov. 30, 2023. [Online]. Available: https://www.researchgate.net/publication/237560464_Relations_between_organizational_identity_identification_and_organizational_objectives_An_empirical_study_in_municipalities

[3] M. Shahid, K. Ullah, K. Imran, N. Masroor, and M. B. Sajid, "Economic and environmental analysis of green transport penetration in Pakistan," *Energy Policy*, vol. 166, p. 113040, Jul. 2022, doi: 10.1016/J.ENPOL.2022.113040.

[4] J. Pucher and R. Buehler, "Cycling towards a more sustainable transport future," *Transp Rev*, vol. 37, no. 6, pp. 689–694, Nov. 2017, doi: 10.1080/01441647.2017.1340234.

[5] I. Mateo-Babiano, S. Kumar, and A. Mejia, "Bicycle sharing in Asia: a stakeholder perception and possible futures," *Transportation Research Procedia*, vol. 25, pp. 4966–4978, Jan. 2017, doi: 10.1016/J.TRPRO.2017.05.375.

[6] P. Winters, F. Cleland, E. Mierzejewski, and L. Tucker, "Assessing Level of Service Equally Across Modes".

[7] C. Silva, J. Teixeira, and A. Proença, "Revealing the Cycling Potential of Starter Cycling Cities," *Transportation Research Procedia*, vol. 41, pp. 637–654, Jan. 2019, doi: 10.1016/J.TRPRO.2019.09.113.

[8] O. C. CO. JAPAN INTERNATIONAL COOPERATION AGENCY, "URBAN TRANSPORT SYSTEM DEVELOPMENT PROJECT FOR COLOMBO METROPOLITAN REGION AND SUBURBS," 2014. Accessed: Dec. 08, 2023. [Online]. Available: https://openjicareport.jica.go.jp/pdf/12176665.pdf

[9] S. Bakker, M. D. Guillen, P. Nanthachatchavankul, M. Zuidgeest, C. F. Pardo, and M. van Maarseveen, "Hot or not? The role of cycling in ASEAN megacities: Case studies of Bangkok and Manila," *Int J Sustain Transp*, vol. 12, no. 6, pp. 416–431, Jan. 2018, doi: 10.1080/15568318.2017.1384522.

[10] T. Götschi, J. Garrard, and B. Giles-Corti, "Cycling as a Part of Daily Life: A Review of Health Perspectives," *Transp Rev*, vol. 36, no. 1, pp. 45–71, Jan. 2016, doi: 10.1080/01441647.2015.1057877.

[11] "2015 at ITDP: Celebrating Successes, Preparing for the Future - Institute for Transportation and Development Policy." Accessed: Dec. 08, 2023.

[Online]. Available: https://www.itdp.org/2016/01/15/2015-at-itdp-celebrating-successes-preparing-for-the-future/

[12] M. Sheller, "The new mobilities paradigm for a live sociology," *http://dx.doi.org/10.1177/0011392114533211*, vol. 62, no. 6, pp. 789–811, May 2014, doi: 10.1177/0011392114533211.

[13] David George Williams, "Social Practice Theory and Sustainable Transport: An Analysis of English Local Transport Planning as a System of Provision," 2015. Accessed: Dec. 08, 2023. [Online]. Available: https://uwe-repository.worktribe.com/preview/806574/Thesis%20David%20Williams_For%20Repository.pdf

[14] R. Buehler, J. P.-C. cycling, and undefined 2012, "International Overview: Cycling Trends in Western Europe, North America, and Australia," *books.google.comR Buehler, J PucherCity cycling, 2012•books.google.com*, Accessed: Feb. 02, 2024. [Online]. Available: https://books.google.com/books?hl=en&lr=&id=226mCyz9JaEC&oi=fnd&pg=PA9&ots=leSvk1iG7K&sig=XAuFMispDAdOOABaVeldYVG_03o

[15] S. D. Parkes, G. Marsden, S. A. Shaheen, and A. P. Cohen, "Understanding the diffusion of public bikesharing systems: evidence from Europe and North America," *J Transp Geogr*, vol. 31, pp. 94–103, Jul. 2013, doi: 10.1016/J.JTRANGEO.2013.06.003.

[16] R. Goel *et al.*, "Cycling behaviour in 17 countries across 6 continents: levels of cycling, who cycles, for what purpose, and how far?," *Transp Rev*, vol. 42, no. 1, pp. 58–81, Jan. 2022, doi: 10.1080/01441647.2021.1915898.

[17] J. Pucher, R. Buehler, D. R. Bassett, and A. L. Dannenberg, "Walking and cycling to health: A comparative analysis of city, state, and international data," *Am J Public Health*, vol. 100, no. 10, pp. 1986–1992, Oct. 2010, doi: 10.2105/AJPH.2009.189324.

[18] E. Heinen, B. van Wee, and K. Maat, "Commuting by bicycle: An overview of the literature," *Transp Rev*, vol. 30, no. 1, pp. 59–96, Jan. 2010, doi: 10.1080/01441640903187001.

[19] UN Climate Technology Centre & Network, "Promotion of non-motorised transport | Climate Technology Centre & Network | Tue, 11/08/2016." Accessed: Dec. 08, 2023. [Online]. Available: https://www.ctc-n.org/technologies/promotion-non-motorised-transport

[20] K. Hosford *et al.*, "Evaluating the impact of implementing public bicycle share programs on cycling: the International Bikeshare Impacts on Cycling

and Collisions Study (IBICCS)," *Int J Behav Nutr Phys Act*, vol. 16, no. 1, Nov. 2019, doi: 10.1186/S12966-019-0871-9.

[21] BALKAN STACEY, "A Just Future for Cycling? - Public Books." Accessed: Dec. 08, 2023. [Online]. Available: https://www.publicbooks.org/a-just-future-for-cycling/

[22] D. J. Benedini, P. S. Lavieri, and O. Strambi, "Understanding the use of private and shared bicycles in large emerging cities: The case of Sao Paulo, Brazil," *Case Stud Transp Policy*, vol. 8, no. 2, pp. 564–575, Jun. 2020, doi: 10.1016/J.CSTP.2019.11.009.

[23] J. Parkin, M. Wardman, and M. Page, "Estimation of the determinants of bicycle mode share for the journey to work using census data," *Transportation (Amst)*, vol. 35, no. 1, pp. 93–109, Jan. 2008, doi: 10.1007/S11116-007-9137-5/METRICS.

[24] J. D. Hunt and J. E. Abraham, "Influences on bicycle use," *Transportation (Amst)*, vol. 34, no. 4, pp. 453–470, Jul. 2007, doi: 10.1007/S11116-006-9109-1/METRICS.

[25] Z. Furness, *One less car: Bicycling and the politics of automobility*. 2010. Accessed: Dec. 09, 2023. [Online]. Available: https://books.google.co.uk/books?hl=en&lr=&id=WV4QSnRqNwEC&oi=fnd&pg=PR7&dq=Zachary+Mooradian+Furness.+(2010).+ONE+LESS+CAR+-+Bicycling+and+the+Politics+of+Automobility.+Temple+University+Press.&ots=EHIPGbcg4Y&sig=9UhA6ibMFgqIjSkfAgs0mk9Dfd0

[26] C. C. O. Reynolds, M. A. Harris, K. Teschke, P. A. Cripton, and M. Winters, "The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature," *Environmental Health*, vol. 8, no. 1, p. 47, 2009, doi: 10.1186/1476-069X-8-47.

[27] S. Hanson and H. Perry, "Evaluating the Impact of Weather on Bicycle Use," vol. 356, no. 2, pp. 125–150, 1971.

[28] T. Thomas, R. Jaarsma, and B. Tutert, "Exploring temporal fluctuations of daily cycling demand on Dutch cycle paths: The influence of weather on cycling," *Transportation (Amst)*, vol. 40, no. 1, pp. 1–22, Jan. 2013, doi: 10.1007/S11116-012-9398-5/FIGURES/9.

[29] J. Dill and K. Voros, "Factors affecting bicycling demand: Initial survey findings from the Portland, Oregon, region," *Transp Res Rec*, no. 2031, pp. 9–17, 2007, doi: 10.3141/2031-02.

[30] J. Y. T. Wang, L. Mirza, A. K. L. Cheung, and S. Moradi, "Understanding factors influencing choices of cyclists and potential cyclists: A case study at the University of Auckland", Accessed: Dec. 09, 2023. [Online]. Available: http://eprints.whiterose.ac.uk/82492/

[31] J. Dill and T. Carr, "Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them," *https://doi.org/10.3141/1828-14*, no. 1828, pp. 116–123, Jan. 2003, doi: 10.3141/1828-14.

[32] S. A. S. T. Salawavidana, L. A. T. U. Liyanaarchchi, R. M. S. K. Senarathna, W. K. Mampearachchi, and J. M. S. Bandara, "Guidelines for the implementation of bicycle lanes on Sri Lankan highways," pp. 369–380, Aug. 2014, doi: 10.31705/APTE.2014.34.

[33] "(PDF) Examination of newly established bicycle lanes in Sri Lanka with special reference to Piliyandala and Katubedda." Accessed: Feb. 04, 2024. [Online]. Available: https://www.researchgate.net/publication/328191911_Examination_of_newly_established_bicycle_lanes_in_Sri_Lanka_with_special_reference_to_Piliyandala_and_Katubedda

[34] M. R. Baltes, "Factors Influencing Nondiscretionary Work Trips by Bicycle Determined from 1990 U.S. Census Metropolitan Statistical Area Data," *https://doi.org/10.1177/0361198196153800113*, vol. 1538, no. 1, pp. 96–101, Jan. 1996, doi: 10.1177/0361198196153800113.

[35] G. Santos, H. Maoh, D. Potoglou, and T. Von Brunn, "ORCA-Online Research @ Cardiff Factors influencing modal split of commuting journeys in medium-size European cities," *J Transp Geogr*, vol. 30, pp. 127–137, doi: 10.1016/j.jtrangeo.2013.04.005.

[36] J. W. Johnson and J. M. LeBreton, "History and use of relative importance indices in organizational research," *Organ Res Methods*, vol. 7, no. 3, pp. 238–257, Jul. 2004, doi: 10.1177/1094428104266510.

[37] M. K. Boakye *et al.*, "A Relative Importance Index Approach to On-Site Building Construction Workers' Perception of Occupational Hazards Assessment," *Med Lav*, vol. 114, no. 3, Jun. 2023, doi: 10.23749/MDL.V114I3.14240.

[38] T. B. Joewono, A. Matthew, and M. Rizki, "Loyalty of Paratransit Users in the Era of Competition with Ride Sourcing," *Sustainability 2021, Vol. 13,*

Page 12719, vol. 13, no. 22, p. 12719, Nov. 2021, doi: 10.3390/SU132212719.

[39] R. Dammulla and R. Mudunkotuwa, "Analysis on the Road Traffic Congestion in Colombo Metropolitan Area," *CINEC Academic Journal*, vol. 5, no. 1, pp. 15–22, Jan. 2022, doi: 10.4038/CAJ.V5I1.70.

[40] D. Phillips *et al.*, "Cycling and Walking Safety: a rapid evidence assessment for the Department for Transport," 2018, Accessed: Feb. 05, 2024. [Online]. Available: https://www.natcen.ac.uk

[41] R. López, M. Cecilia, ; Wong, Y. Diew, R. Lopez, and M. C. & Wong, "Attitudes towards active mobility in Singapore: A qualitative study," 2017, doi: 10.1016/j.cstp.2017.07.002.

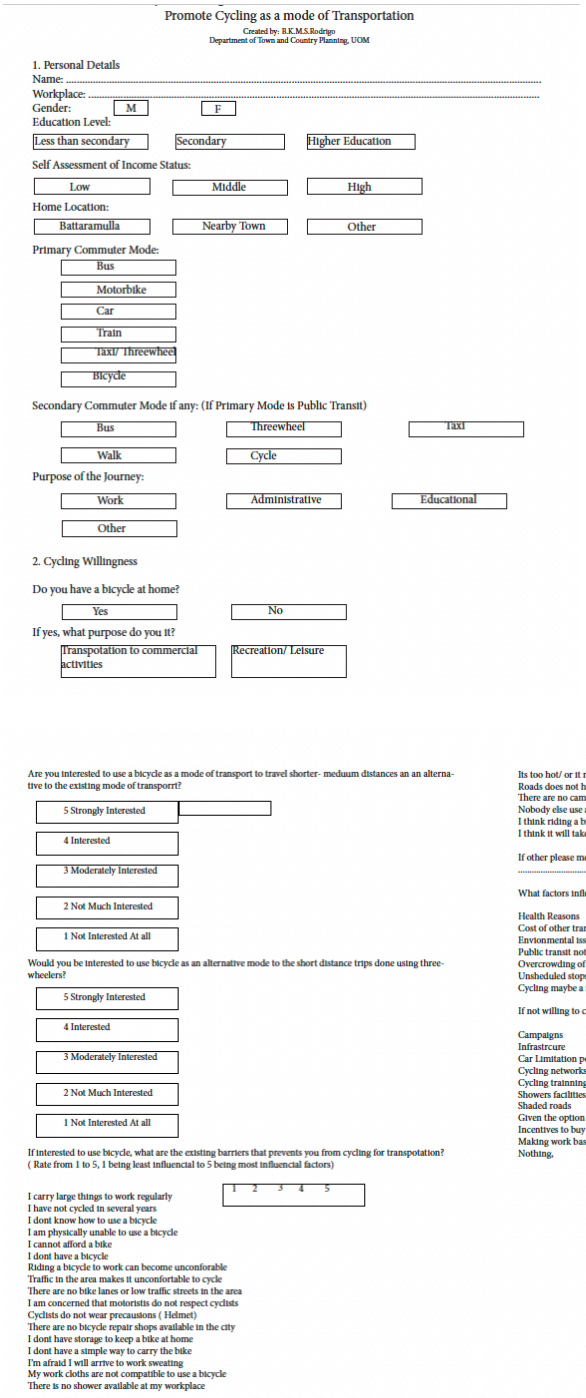
[42] C. Coughenour, A. Paz, H. de la Fuente-Mella, and A. Singh, "Multinomial logistic regression to estimate and predict perceptions of bicycle and transportation infrastructure in a sprawling metropolitan area," *J Public Health (Bangkok)*, vol. 38, no. 4, pp. e401–e408, Dec. 2016, doi: 10.1093/PUBMED/FDV179.

[43] C. Rissel, D. Merom, A. Bauman, J. Garrard, L. M. Wen, and C. New, "Current Cycling, Bicycle Path Use, and Willingness to Cycle More—Findings from a Community Survey of Cycling in Southwest Sydney, Australia," *J Phys Act Health*, vol. 7, no. 2, pp. 267–272, Mar. 2010, doi: 10.1123/JPAH.7.2.267.

[44] Road Development Authority, "NATIONAL ROAD MASTER PLAN ." Accessed: Feb. 05, 2024. [Online]. Available: https://docplayer.net/24259032-National-road-master-plan.html

APPENDIX

Questionnaire survey



Promote Cycling as a mode of Transportation

Created by: B.K.M.S.Rodrigo
Department of Town and Country Planning, UOM

1. Personal Details

Name: .....

Workplace: .....

Gender: M F

Education Level:

Less than secondary | Secondary | Higher Education

Self Assessment of Income Status:

Low | Middle | High

Home Location:

Battaramulla | Nearby Town | Other

Primary Commuter Mode:

Bus
Motorbike
Car
Train
Taxi/ Threewheel
Bicycle

Secondary Commuter Mode if any: (If Primary Mode is Public Transit)

Bus | Threewheel | Taxi
Walk | Cycle

Purpose of the Journey:

Work | Administrative | Educational
Other

2. Cycling Willingness

Do you have a bicycle at home?

Yes | No

If yes, what purpose do you it?

Transpotation to commercial activities | Recreation/ Leisure

Are you interested to use a bicycle as a mode of transport to travel shorter- meduum distances an an alternative to the existing mode of transporrt?

5 Strongly Interested
4 Interested
3 Moderately Interested
2 Not Much Interested
1 Not Interested At all

Would you be interested to use bicycle as an alternative mode to the short distance trips done using three-wheelers?

5 Strongly Interested
4 Interested
3 Moderately Interested
2 Not Much Interested
1 Not Interested At all

If interested to use bicycle, what are the existing barriers that prevents you from cycling for transpotation?
(Rate from 1 to 5, 1 being least influencial to 5 being most influencial factors)

	1	2	3	4	5
I carry large things to work regularly					
I have not cycled in several years					
I dont know how to use a bicycle					
I am physically unable to use a bicycle					
I cannot afford a bike					
I dont have a bicycle					
Riding a bicycle to work can become unconforable					
Traffic in the area makes it unconfortable to cycle					
There are no bike lanes or low traffic streets in the area					
I am concerned that motoristis do not respect cyclists					
Cyclists do not wear precaustions (Helmet)					
There are no bicycle repair shops available in the city					
I dont have storage to keep a bike at home					
I dont have a simple way to carry the bike					
I'm afraid I will arrive to work sweating					
My work cloths are not compatible to use a bicycle					
There is no shower available at my workplace					
Its too hot/ or it rains a lot					
Roads does not have tree coverage and shade					
There are no campaigns/ activisits groups that encourages to cycle					
Nobody else use a bicycle in the city					
I think riding a bicycle in the city makes me look cheap					
I think it will take longer to reach my destination					

If other please mention here .....

.....

What factors influeces the most for you to use bicycle

	1	2	3	4	5
Health Reasons					
Cost of other transport modes					
Enviornmental issues related to other modes of transportation					
Public transit not having door to door access					
Overcrowding of the public transit					
Unsheduled stops					
Cycling maybe a faster option than waiting in the traffic					

If not willing to cycle, what measures would motivate you to use a bicycle

	1	2	3	4	5
Campaigns					
Infrastrcure					
Car Limitation policies/ Traffic reduction policies					
Cycling networks					
Cycling trainning lessons at work					
Showers facilities at work					
Shaded roads					
Given the option to rent a bicycle					
Incentives to buy a bicycle					
Making work based travel plans					
Nothing,					