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Sustainable Transportation - Evaluating the Determinants of Intention to Adopt Cycling as a Work Travel Mode

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ABSTRACT
Transformation in the transportation sector is imperative to address the environmental issues and combat climate change. The study examined the determinants of intention to adopt cycling as a sustainable work travel mode among individuals in mumbai city. The responses were collected using a structured questionnaire based on the theory of planned behaviour. Individuals riding a cycle or sometimes using a cycle to workplace were the target audience of the study. Sem technique was used to identify the significant determinants of intention to adopt cycling as a sustainable work travel mode. The analysis found the "perception of environment" as the only significant contributor to the intention to adopt cycling as a sustainable work travel mode. The study highlights the urgent need to augment the infrastructure for cycling. The findings of the study may help enhance the usage of cycles as a work travel mode.

Keywords: Bicycling, Cycling, Sdgs 2030, Sustainability, Transportation, Vehicular Emissions

INTRODUCTION

The increase in pollution and greenhouse emissions has convinced many countries to realise the potential of environmentally friendly and sustainable modes of transportation. "Sustainable Transportation" include those modes of transportation that requires less energy and emit less harmful gases. They are fuel friendly and provides access to affordable transportation. Additionally, they help reduce the burning of natural gases and reduce reliance on foreign fuel and create jobs in the sector. Curtailing the dependency on cars to reduce traffic congestion and control the harmful effects on the environment and people's lives remains one of the most discussed global agendas.

Cycling is a sustainable and non-motorised form of transportation. Bicycle/cycle ridership has been encouraged in many parts of the world. Cycling is cost-effective, keeps one active, and helps achieve multiple sustainable development goals. It is a zero-emission mode and promotes a healthy lifestyle. World Health Organisation is working towards promoting cycling for both transport and recreation. Those residing in rural areas and working in the informal sector heavily depend on it as it is sometimes the only medium for them to access opportunities and livelihood. The manufacturing of cycles also boosts the cycling industry.

THEORETICAL BACKGROUND

The Theory of Planned Behaviour (TPB) is an extension of the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The theory explains that three constructs - "attitude" (behaviour), "subjective norms" (normative), and "perceived behavioural control" drives the behaviour of the humans. Individuals tend to perform a behaviour when their attitude is positive, believe significant others perform it and when it is under their control. The theory is a framework dealing with the complexities of human social behaviour and has been used in varied disciplines for predicting individuals' behaviours.

The current study uses all these three constructs and adapts another construct, 'Perception of Environment', from the study of Acheampong, 2017. The necessary modifications have been made to make the theory applicable to the current study.

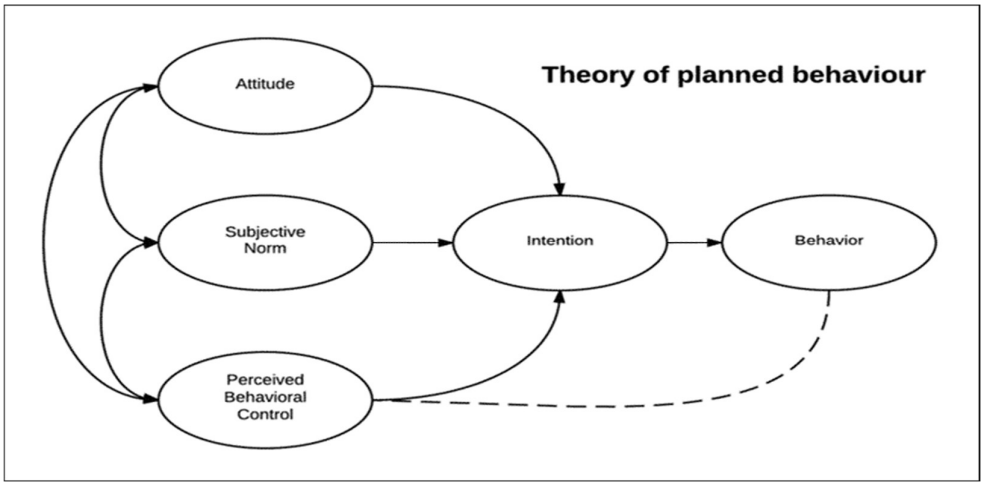

Figure 1: TPB (Icek Ajzen, 1991)

Constructs	Definition in the Study
Attitude (Ajzen, 1991)	gree of favourable/ unfavourable judgement towards riding cycle to workplace
Perceived Behavioural Control (Ajzen, 1991)	erception of ease/ difficulty in cycling to workplace
Subjective Norm (Ajzen, 1991)	perceived social pressure to cycle to workplace or not to cycle to workplace
Perception of the Environment (Acheampong, 2017)	oad discipline and availability of infrastructure that supports cycling to workplace
Intention (Ajzen, 1991)	willingness and intent to use cycle as a travel mode

Table 1: Explanation of the Constructs

Source: Adapted and Modified from TPB (Ajzen, 1991) and Acheampong (2017)

REVIEW OF LITERATURE

UNRIC (2023) - Cycling helps achieve numerous Sustainable Development Goals (SDGs). Cycling is easily affordable by lower income groups (Goal 1) and enables them access to education, jobs and several opportunities. Cycling allows small-scale food producers better access to markets and communities (Goal 2). Physical activity increases because of cycling, and air quality improves by replacing motorised transport, thereby achieving good health and well-being (Goal 3). Cycling helps reduce gender inequality (Goal 5) by providing access to opportunities for girls and women. Goal 7 of affordable and clean energy is easily met by adopting a cycle for daily means of transportation. The cycling industry gives a boost to employment opportunities (Goal 8). The industry is getting innovative by giving thrust to sustainable modes of transportation (Goal 9). Increased cycling, walking and public transport usage help build sustainable cities and communities (Goal 11). Cycling also decarbonises societies (Goal 13).

T E R I (2018) share of cycling is low despite its numerous benefits and is majorly used by people with no access to other means of mobility. India witnessed a sharp decline in the ownership of bicycles between 2001 and 2011. The preference for motorised transport, the absence of a safe cycling environment and rising income are a few reasons for the decline in the growth of bicycles. Government needs to promote cycling by lowering taxes and adopting actions that minimise the use and purchase of motorised vehicles. Additionally, the availability of infrastructure that supports cycling definitely can boost its usage as mode of transportation.

Acheampong, Ransford (2017) the study evaluated the intentions of the adults towards bicycling as a travel mode in Ghana, West Africa. The investigator employed the Theory of Planned Behaviour. Perceived Behavioural control had the most substantial impact on intention towards cycling. A negative association was found between attitude towards the cycle and social norms. A negative association was also found between social norms and perceived behavioural control.

Nathani, N. (2017) researcher considered the cycle as one of the lowest carbon-emitting modes of travel and the best alternative to fossil fuel. The study also explained the benefit of the cycle being economical and easy to maintain. The only challenge of this mode is its speed and suitability for travel up to a distance of 5km.

Tumbling, J. (2012) describes the need for sustainable fuel and transportation. The author mentioned that the futuristic city should have the following - walking to be a pleasure for everyone, availability of daily needs at walking distance, bicycling friendly environment, and provision of fast and reliable transport.

STATEMENT OF THE PROBLEM

Vehicular pollution has become a cause of concern. The exploding population and dependency on cars have led to the urgent need to reduce the negative impacts associated with mobility. Switching to environment-friendly modes of transportation is one of the solutions as it will result in less emissions, protect the environment and improve the well-being of the people. Cycling not only protects the environment but also help reduce the sedentary lifestyle of people. Thus, it is interesting to comprehend the perception of the individuals towards cycle as their travel mode.

SIGNIFICANCE OF THE STUDY

Despite the numerous benefits bicycling offers, the share of cycling remains low. Many consider it an inferior mode of travel compared to motorised modes of transport. Cycling has always been considered a supplementary mode of transportation and has been marginalised. There is a dearth of academic literature on cycle as a mode of transportation. Thus, the study attempts to investigate the factors that influence the individuals in the city to ride a cycle to their workplace.

SCOPE OF THE STUDY

The data was collected from individuals in Mumbai who, at some point in their life, used the cycle or are currently riding the cycle to commute to their workplace. The study used the TPB and modified and adapted the constructs and items suitable for the present research.

OBJECTIVE OF THE STUDY

To evaluate the determinants of intention to adopt cycling as a sustainable work travel mode among individuals in Mumbai City.

Hypotheses of the Study

1. Attitude significantly influences the intention to adopt cycling as a sustainable work travel mode among individuals in Mumbai City.
2. Perceived Behavioural Control significantly influences the intention to adopt cycling as a sustainable work travel mode among individuals in Mumbai City.
3. Subjective Norm significantly influences the intention to adopt cycling as a sustainable work travel mode among individuals in Mumbai City.
4. Perception of Environment significantly influences the intention to adopt cycling as a sustainable work travel mode among individuals in Mumbai City.

RESEARCH METHODOLOGY

Research Design - The researchers adopted descriptive research design for the present study. This design aids in understanding the attitudes of the respondents.

Designing of the Questionnaire - The questionnaire has been designed based on TPB. There are four independent variables and one dependent variable. The constructs and items of the theory were modified and adapted to fulfil the objective of the current research. The responses were collected on a Likert scale having five anchor points. The questionnaire also comprised of a few demographic questions. However, they were excluded from the statistical analysis.

Data Collection Method - The primary survey form collected responses using a google form. The secondary data was gathered from the available and existing sources.

Sampling Method - The sampling method selected was non-probability convenience and snowball sampling. Individuals riding or having used cycles to their workplace were the target audience of the study.

Sample Size - 200 individuals riding a cycle to their workplace, including a few who sometimes used the cycle to their workplace.

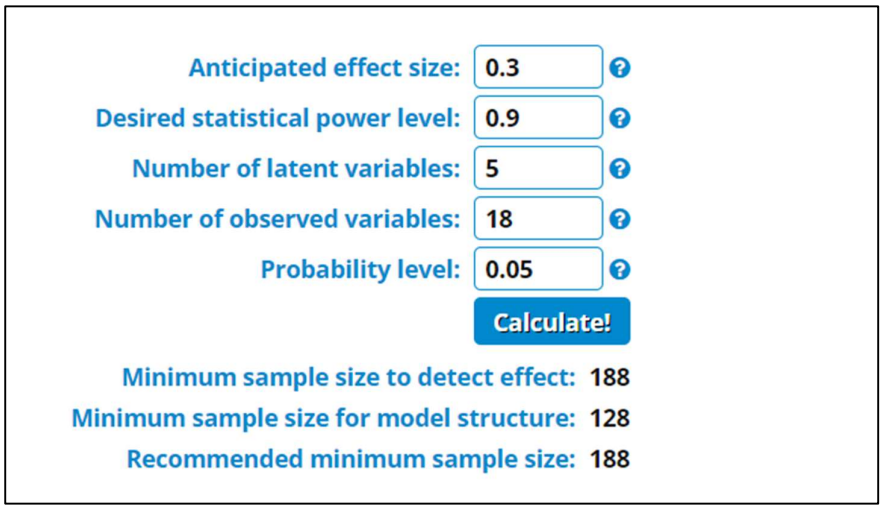

Figure 2: Sample Size Calculator

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Statistical Tools and Techniques - The statistical tool used is SMART PLS, and the technique used is Structural Equation Modelling (SEM).

LIMITATIONS OF THE STUDY

The survey form collected data only from those individuals who understood English and had access to smartphones.

RESULTS

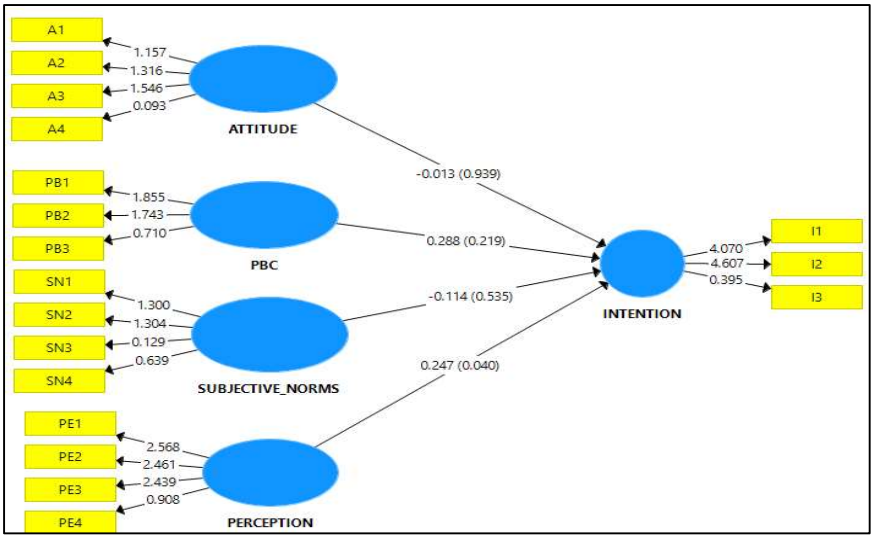

Figure 3: SEM Model

Source: Output from the result of the primary data analysis

FINDINGS

Path	Beta Coefficient	T-Statistics	P -Value	Results
Attitude (A) → Intention (I)	-0.013	0.077	0.939	Insignificant
Perceived Behavioural Control (PBC) → Intention (I)	0.288	1.231	0.219	Insignificant
Perception of Environment (PE) → Intention (I)	**0.247**	2.063	**0.040**	**Significant**

Subjective Norms (SN) → Intention (I)	-0.114	0.621	0.535	Insignificant

Table 2: Hypothesis Testing

Source: Primary Data Collection

The above table depicts the coefficient of four independent constructs. Perception of Environment had the maximum coefficient beta value of 0.247, and its p-value is 0.040. This indicates that Perception of Environment significantly contributes to the Intention to adopt cycling as a sustainable work travel mode. The other constructs, "Attitude", "Perceived Behavioural Control" and "Subjective Norms", have a p-value of more than 0.05, indicating an insignificant relationship towards the dependent variable Intention (I).

CONCLUSION AND IMPLICATIONS

The above result shows that only Perception of Environment had a significant relationship towards the Intention to adopt cycling as a sustainable work travel mode. It means a safe and better infrastructure for cycling will encourage more individuals to use cycles for their regular commute. Perceived Behavioural Control is not an influencing factor towards the Intention to adopt cycling as a travel mode. It could be because those individuals may not be confident enough to cycle to work on a regular basis. Attitude also did not contribute significantly to the dependent variable. It could be because of the belief that cycling is not comfortable and safe. Subjective Norms are not a predictor of Intention to adopt cycling as a sustainable work travel mode indicating that significant others cannot convince someone to cycle to work.

Cycling is an inexpensive form of transport, improves physical activity and is easy to navigate crowded streets. There is a need to create infrastructure for safe and obstacle-free movement of human-powered and active transportation such as walking and cycling. The streets need to be redesigned. Safe pedestrian zones and bicycle lanes must be constructed to encourage people to walk and cycle. Sustainable transport aims to reduce carbon dioxide emissions and atmospheric pollution, improving air quality. Thus, sustainability in transport will help achieve the other goals of SDG. Future studies can be conducted by analysing the demographic profile of the respondents.

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