

The use of public bus transport as an option for
climate change mitigation option and sustainable
mobility in Mauritius – challenges and
opportunities

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Introduction



- Transport accounts for nearly a quarter of current energy-related carbon dioxide emissions, a major source of global warming.
- There are concerns that current trends in transport are not sustainable over the long term.
- Worldwide, car travel constitutes more than three quarters of all vehicle kilometres travelled.

Introduction



- Mobility is recognised as being one of the most important prerequisites to achieving improved standards of living.
- Enhanced personal mobility increases access to basic services as well as leisure activities and hence increases the choices open to individuals and determines their lifestyles (WBCSD 2004).
- However enhanced mobility comes at a price and problems associated to increase in transport activity are traffic fatalities, congestion, air and noise pollution and emission of greenhouse gases.

Transport and global warming



- As a matter of fact transport accounts for nearly a quarter of current energy-related carbon dioxide emissions, a major source of global warming.
- The transport sector represents the fastest growing source of GHG emissions actually (Wright and Fulton 2005) and transport activity is expected to keep on increasing and unless there is a major shift away from current patterns of energy use, total transport energy use and carbon emissions is projected to be about 80% higher than current levels by 2030 (Ribeiro et al. 2007).

Changing transport behaviour



- Interventions to change transport behaviour, and especially to use public transport and reduce car use, could reduce emissions from road transport more quickly than technological measures.
- However, it is unclear which interventions are effective and what are the barriers to sustainable transport behaviour.

Objectives



- As a preliminary study, the analysis attempts to model transport behaviour to unravel the opportunities and challenges facing a small island economy such as Mauritius to adopt a different perspective towards public transport.
- We undertake a survey of 383 respondents to examine the factors which may motivate or discourage public transport.

The Situation in Mauritius



- In Mauritius as well current trends in transport are not sustainable over the long term; Transport activity has been growing robustly and the number of cars have increased by 450% since 1979.
- This drastic increase in cars is not without cost; traffic congestion is a big concern in Mauritius and the estimated cost of congestion totals MRU 2 billion per year (Rughooputh et al 2007).
- Moreover the increase in emissions of GHGs is contributing to Climate change which will affect some of the pillars of the Mauritian economy such as agriculture, fisheries and the tourism industry (Read 2010).

Why this craze towards private transport?

- Forces in social change, such as rising income, more leisure time, changing demographic patterns, and education, interact with the mode of transport and lead to more private car travel.
- The shift from public transport to private transport in Mauritius also stems from the fact that the former mode is generally considered to operate with low productivity levels, poor frequency and technological inadequacy

Use of Public Transport as a means of Sustainable Transport

- The easiest solution to congestion problems and reduce road transport emissions in Mauritius is to encourage passengers to shift back to public bus transport which is already available.
- However there are many factors which affect this modal choice.

Factors affecting modal choice



- The modal choice depends on socio-demographic factors as well as the attributes of the public transport.
- The attributes of the public bus transport which affects the modal choice mainly in Mauritius are comfort and reliability.

Purpose of research



- ❑ This research tries to determine whether an improvement in comfort and reliability of buses would encourage a switch of the actual car users to public bus transport.
- ❑ A survey of 240 car users was undertaken to to examine the factors which may motivate or discourage public transport.
- ❑ Some questions about the perception of the car users on climate issues were also included.

Methodology

- A binary logit is used to model the willingness of car users to switch to public buses

$$P(Y_i = 1) = \frac{e^{(\alpha + \sum \beta_i x_i)}}{1 + e^{(\alpha + \sum \beta_i x_i)}}$$

Where: $P(Y_i=1)$ = the probability a car user switches to public transport

The model is based on the utility theory, which assumes that the individual's preference for an alternative is captured by his utility (U). The individual selects the alternative in the choice set with the highest utility.

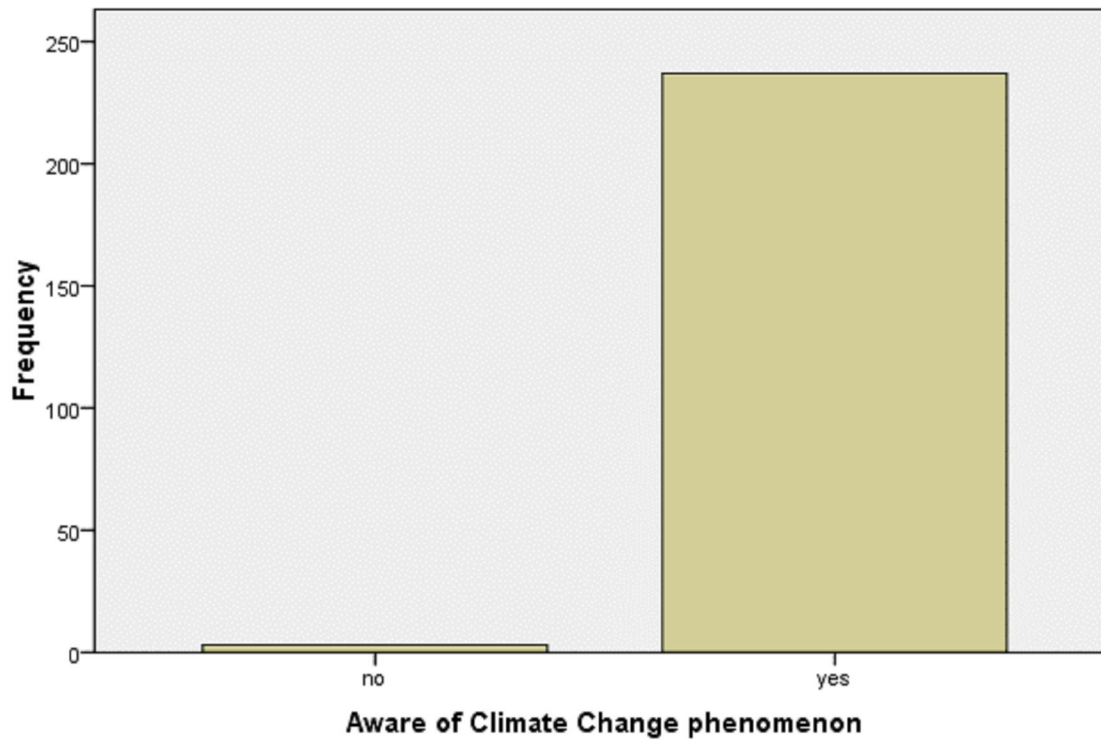
Descriptive statistics

Characteristics	N	Mean	Standard deviation
1. Location	240	0.6208	0.48619
2. Age	240	39.8958	13.93718
3. Gender	240	0.4948	0.50063
4. Work	240	0.8125	0.39082
5. Monthly income	240	31312.50	13446.25
6. Married	240	0.9417	0.23486
7. Partner work	226	0.9159	0.27811
8. Children	240	0.9042	0.29488
9. Family size	240	4.0250	0.86264
10. Number of trips	240	7.6417	2.66323
11. Time to nearest bus stop	240	5.5333	5.92553

(Source: author)

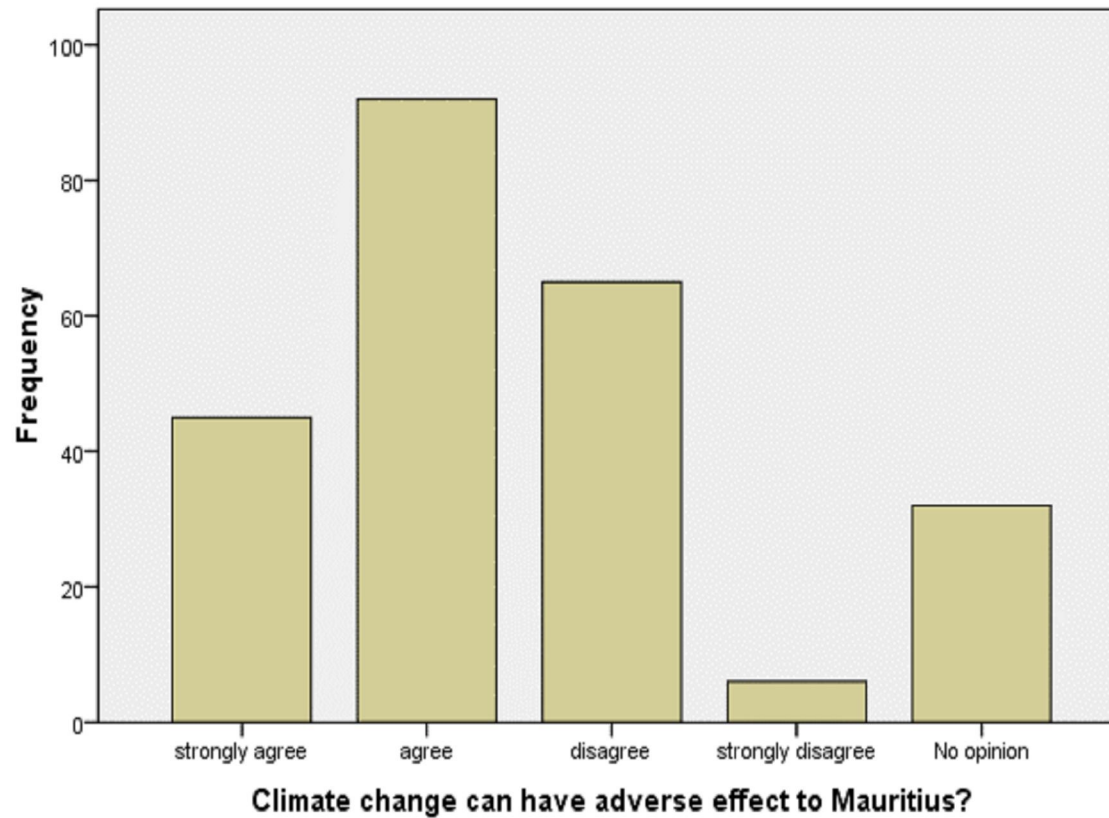
Perception Climate Change

Aware of Climate Change phenomenon



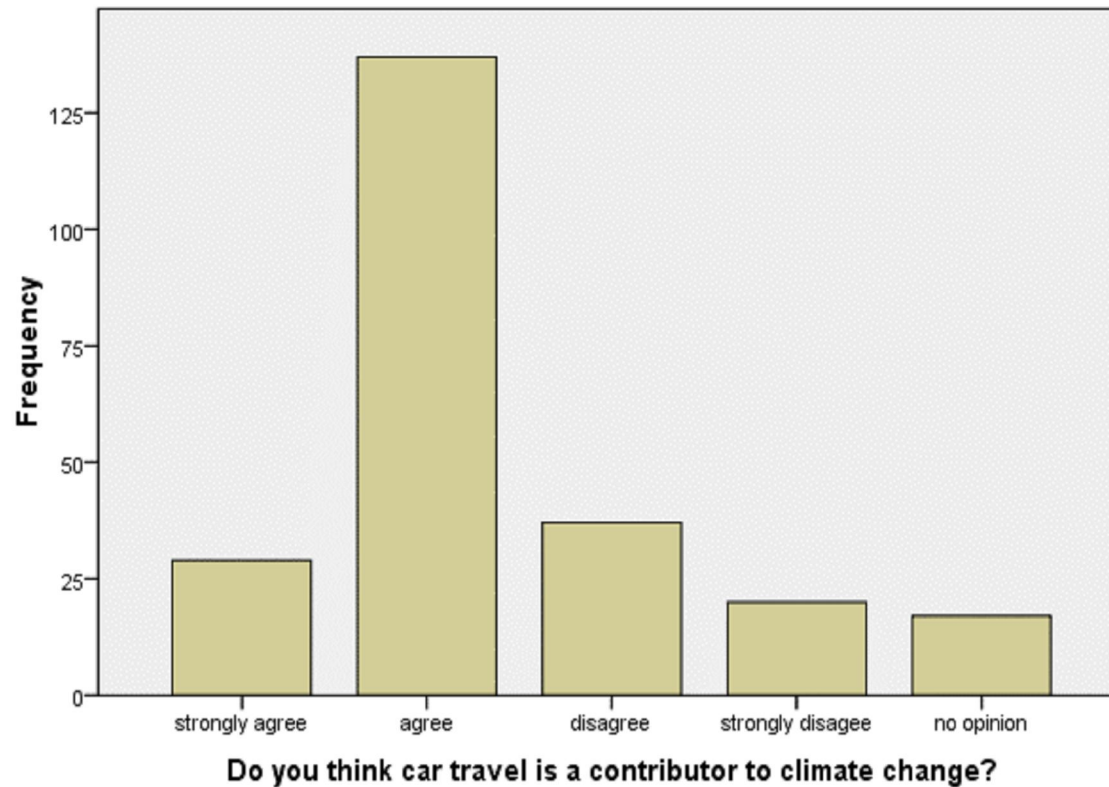
Perception Climate Change

Climate change can have adverse effect to Mauritius?



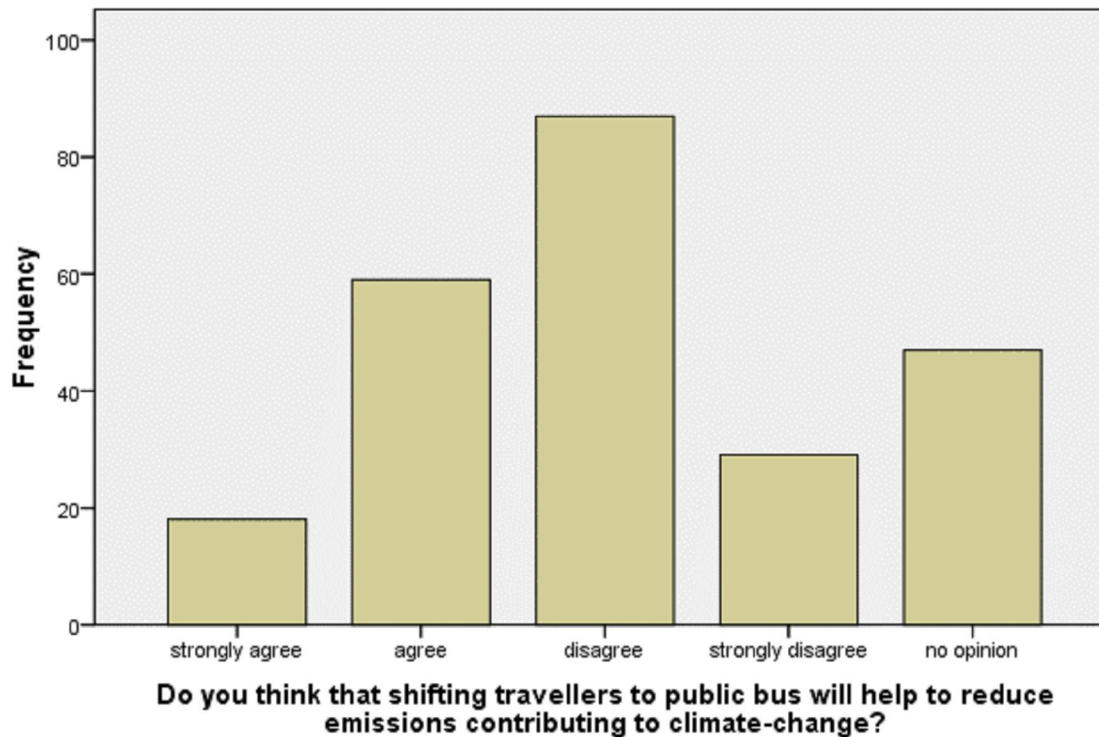
Perception Climate Change

Do you think car travel is a contributor to climate change?



Perception Climate Change

Do you think that shifting travellers to public bus will help to reduce emissions contributing to climate-change?



Logit Results For More Comfortable Buses

Independent Variables	Estimated coefficient
Constant	-0.935 (1.845)
Age	-0.384*** (0.152)
Gender	0.62 (0.297)
Monthly Income	-0.76 (0.139)
Number of trips	-0.089* (0.057)
Wait Environment comfortable	0.852*** (0.298)
Wait Environment Safe	0.449 (0.746)
Time to nearest bus stop	0.051** (0.026)
Aware Climate Change	1.591 (1.177)
Effects of Climate Change on Mauritius	-0.24 (0.144)
Contribution of Car to Climate Change	-0.22 (0.171)
Use of Bus can help to mitigate emissions	0.325** (0.165)
Cox & Snell R ²	0.120
Nagelkerke R ²	0.162
N	240

(Source: Author)

Logit Results For More Reliable Buses

Independent Variables	Estimated
coefficient	
Constant	2.629* (1.476)
Age	-0.34 (0.154)
Gender	-0.585* (0.317)
Monthly Income	-0.211* (0.139)
Number of trips	-0.100* (0.106)
Wait Environment comfortable	0.613** (0.309)
Wait Environment Safe	-1.092* (0.697)
Time to nearest bus stop	-0.031 (0.026)
Aware Climate Change	-0.491 (0.937)
Effects of Climate Change on Mauritius	0.390** (0.158)
Contribution of Car to Climate Change	0.104 (0.180)
Use of Bus can help to mitigate emissions	0.047 (0.170)
Cox & Snell R ²	0.124
Nagelkerke R ²	0.172

N 240 Note: Standard errors are shown in brackets. ***, **, * indicate significance at the 1, 5, 10

Discussion of Results: Improvement in comfort

1. Young people are more likely to shift to public transport
2. However, young people who has not been driving for a long time is more reluctance to shift to public transport
3. Comfortable waiting environment matters for model choice
 - ▣ Good waiting for the bus increases the likelihood to shift to buses if they are more comfortable.
 - ▣ The waiting environment also implies security and is also important as no one would be willing to wait for the bus in an uncomfortable place without protection from the weather.

Discussion of Results: Improvement in Comfort

4. Accessibility to public transport and number of trips were also found to affect the modal choice.
 - Those who had a bus stop nearer to their house were most willing to shift to buses
 - Those who had less number of weekly trips are also more willing to shift to bus transport
 - Travelling by buses is often more tiring and people who travel a lot are not willing to switch to buses.
 - Respondents aware that use of buses could reduce GHG emissions were more willing to shift to buses.

Discussion of Results: Improvement in Reliability

- Men were found to be more willing to switch to buses if they were more reliable.
- Women are less willing to travel by bus
 - ▣ The explanation could be security -they feel safer while travelling in their car.

Discussion of Results: Improvement in Reliability

- Respondents with lower income were more willing to shift following an improvement in reliability.
 - ▣ Transport budget is an important component for household budget
- Using private transport is much more expensive than public transport, even though some people in the lower income group prefer to use car because of the unreliable service provided.
- Passengers with lower number of trips and having a comfortable waiting environment were willing to switch to public transport following an improvement in reliability as well as in comfort.
- Respondents are aware of the effects a change in climate could have on our economy were more willing to shift to buses.