Mercator Research Institute on
Global Commons and Climate Change gGmbH

Determinants of low-carbon transport mode adoption

Evidence from systematic review of reviews

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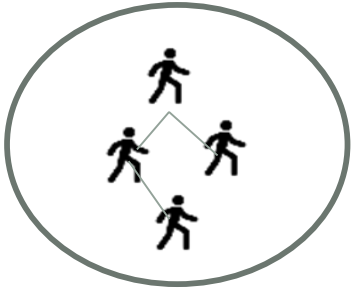
(Work in progress)

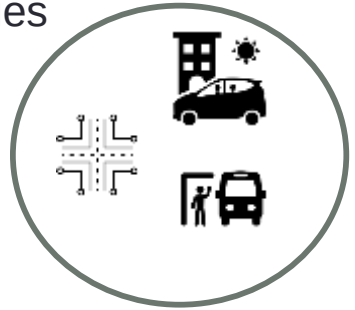
Research on Low-carbon transport behavioral patterns

psychology, economics

sociology, agent-based models



Economics, architecture, urban studies



Large literature distributed across disciplines, methods, approaches
This creates issues regarding the relative importance of different factors.

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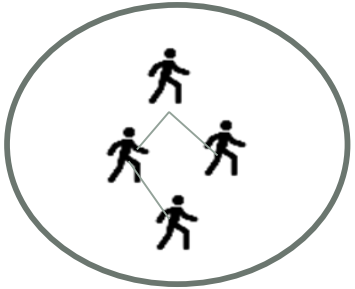

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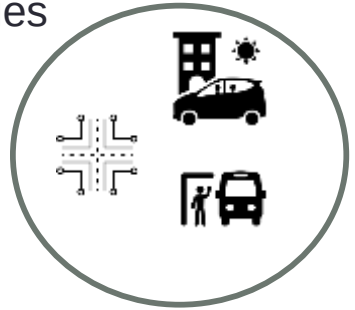
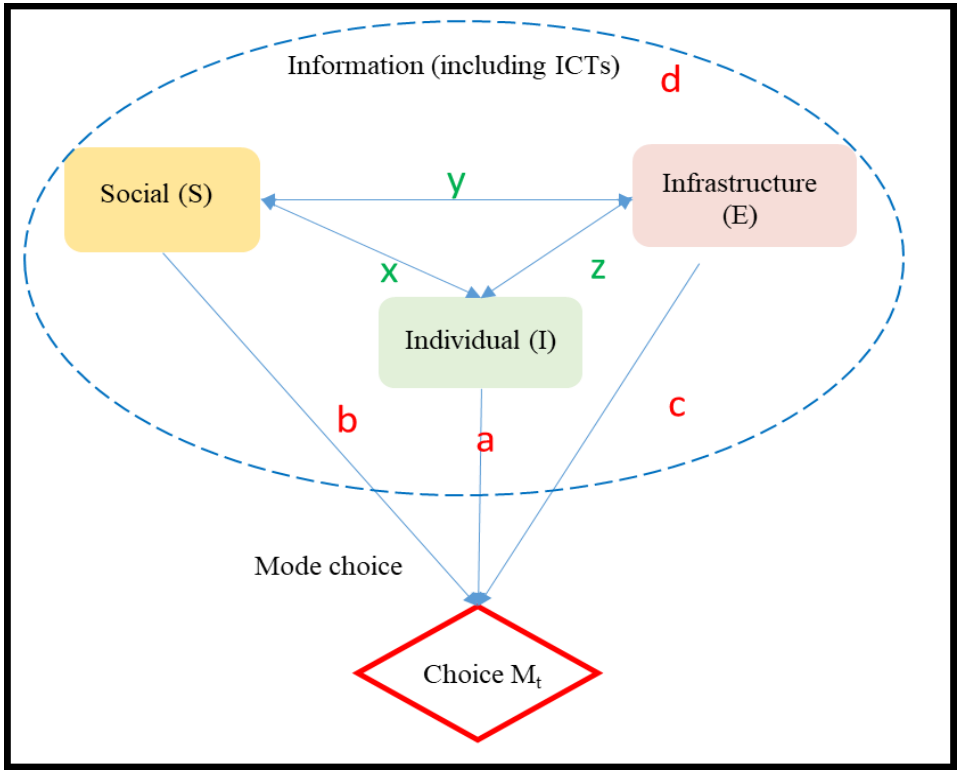


Understand the relative importance of different factors and put them together under one framework

Framework



Direct effects:

[a]

[b]

[c]

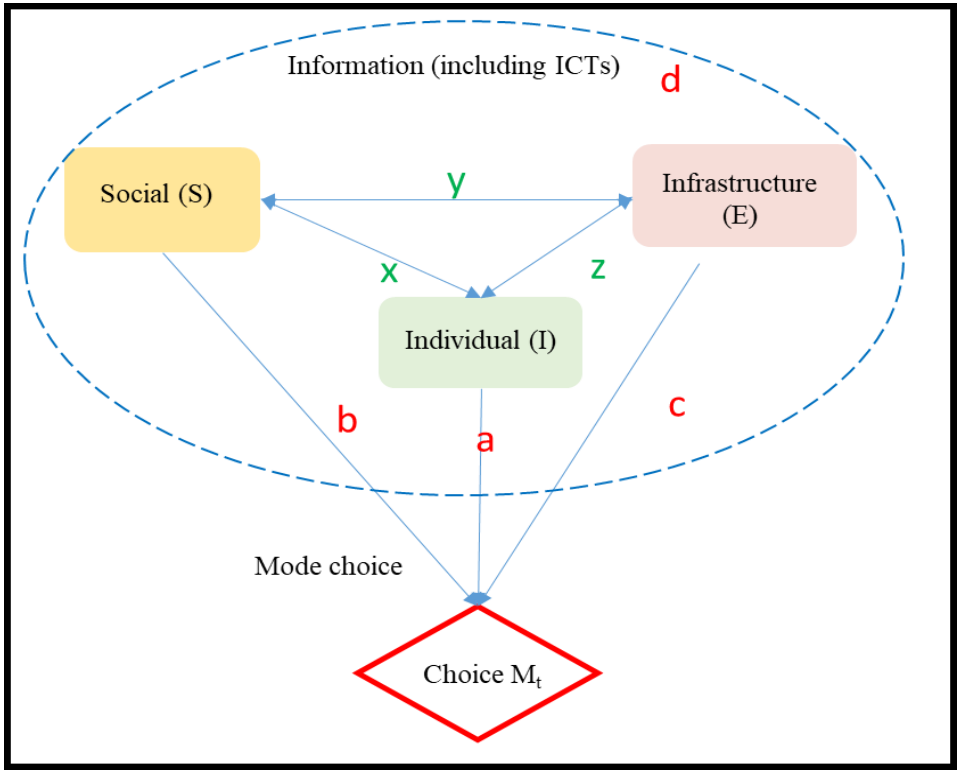
Conditional effects

(a|S); (a|E); (b|E); (S|E)

Interactions effects

x, y, z

Framework results



Direct effects:

[a] :

(non-habit) individual factors can explain **20-30%** of variation in travel mode choice.

[b] :

social factors can explain **10-20 %** of variation in travel mode choice.

[c] :

Changes in infrastructure can lead to **20-30%** increase in alternate transport mode uptake.

Results summary

Individual

Mode	Evidence summary for individual factors	Evidence strength
	High correlation between **habits** (r = 0.42) , **past use** (r = 0.69) on car use. **PBC** (r = 0.27) has a lower but also significant correlation.	
	peronsal values (r = 0.36) and **alturistic value orientation** (r = - 0.32) are also related to car use. Personality related factors are more important in explaining intentions as compared to reported behavior	
	Even higher correlation between **habits** (r = 0.68) , **past use** (r = 0.85) on non-car use. **PBC** (r = 0.38) is more important for non-car use options.	
	percieved usefulness (r = 0.42) is also associated with non-car use.	
	60% of the studies find that age, gender and employment status are important predictors of bicycle use.	

Social

Mode	Evidence summary for social factors	Evidence strength
	Subjective norms (r = 0.36) are related to car-use. **Descriptive norms** have very limited explanatory power (r = 0.07-0.18)	
	Small but significant coorelation between **identity** (r = 0.08) and car-use	
	Subjective norms have a mojor role in shaping non-car use as well as intention to use non-car options (~30% variation in intentions can be explained by social norms). **Descriptive norms** have limited impact.	
	Social status is important predictor. More important "who is using bicycles" than "how many".	
	Joint actvities and **peer encouragement** are important factors in higher bicycle useage.	
	Descriptive norms (knowing more people use Public transport) leads to higher proponsity to use Public transport.	

Infrastructure

Mode	Evidence summary for infrastructure factors	Evidence strength
	Car use reduces with **population density** (elasticity = -0.04), and **diversity** (elasticity = -0.09). The reduction in car use is highest for changes in street **design** (elasticity = -0.12), and **destination accessibility** (elasticity = -0.22)	
	Walkability improves most with **intersection density** (elasticity = 0.39) and **job-housing balance** (elasticity = 0.19)	
	Provision of **Bike lanes** can lead to 10% (range 6–21%) shift from other transport modes to bike use.	
	Integration of bike lanes with **transprt network** and better **provision of services** at destination can lead to further increase in bike-use (~ 5-10%).	
	Transit use increases with better street **design** (elasticity = 0.29) and **destination accessibility** (elasticity = 0.29)	
	Per capita ridership is positively associated with **network coverage and infrastructure** (around 5-30 % mode shift from cars). Only marginal gains with better **service quality attributes** (1-5% mode shift from cars).	

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Policy implications

- Infrastructure factors are highly important for adoption of alternative transport modes (directly & indirectly)
- Social identity/status is important leverage for promoting bicycling and reducing car use