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Psychological Factors Influencing Public Willingness to Pay for Road Safety Improvement

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Abstract: Road safety remains a global issue, due to mashroom growth in vehicle ownership pakistan is facing severe problems of road accidents thus, road safety improvement is urged to reduce the accidents. This study examined the psychological factors which motivates road users for safety improvements. Based on theory of planned behavior and latent psychological variables demonstrating personal characteristics and examination of various measures, a structural equation model was applied to investigate public willingness to pay. The developed SEM model was tested with a sample of 1027 respondents. The model demonstrated that public WTP strongly correlates with road condition safety perception, road accident risk perception, behavioral control, attitude towards safety responsibility, driving attitude, perceived fairness, and effectiveness. The study's findings help policymakers to implement, and execute road safety projects and budget sanctions.

Keywords: Accident, Safety Improvement, Policymakers, Psychological Factors

Introduction

As per "Global Status Report on Road Safety - 2018," nearly 1.35 million of individuals loss life while 20-50 million get injured in road traffic accidents annually(WHO 2018). RTA is being reported as the 8th leading cause of fatality for every age and is the 1st leading cause for childes and adults



under 29 years of age. Approximately 54% of the total world vehicles are registered in developing countries but 90% accidents occur on their roads(WHO 2015). Pakistan has three times as many road accidents as developed countries, that costs the nation \$6.48 million/year(Ahmed 2007). RTA is the 2nd and 5th leading causes of physical disability and life loss in the country(Hyder and Morrow 2000). Road safety management decisions that reduce traffic accidents typically use public funds, straining government and individual budgets. In developing countries, limited resources force decision-makers to choose between projects of road safety improvement(Chaturabong, Kanitpong et al. 2011). Road safety must be valued for cost comparison and accident risk reduction(Wijnen, Stipdonk et al. 2016). WTP is the sum of amount an individual is willing to donate to a road safety program(Haddak, Lefèvre et al. 2016). Policymakers can launch road safety campaigns that encourage public by identifying factors for reduction of accidents. Public willingness-to-pay has been investigated in developed countries but not in developing countries(Hensher, Rose et al. 2009), this research aims to understand WTP in Pakistan's context.

Researchers use various methods to study public WTP. Because it predicts and understands human behavior from multiple perspectives, the Theory of Planned Behavior is more appropriate, several studies have also shown its predictive power in understanding public decision-making(López-Mosquera, García et al. 2014). In very few studies the correlation of psychological factors and public WTP for road safety have been examined(Subhan, Zhao et al. 2021). Detailed variance has been investigated by incorporating additional variables. SEM is applied to test variables relationship on 1027 participants. Common Method Bias was tested on the measured model to prove data validity.

Research Results

Because the study's goal is to probe public contributing factor of WTP for improved road safety, SEM was applied to test the structural correlation among independent psychological factors and the dependent latent variable as WTP(Qu 2007). The SEM was developed using the statistical package R. A two-stage approach was employed for SEM construction. During the initial stage, confirmatory factor analysis (CFA) was utilized to examine the soundness and consistency of underlying constructs. The adequacy of the CFA was assessed, and then a structural equation modeling (SEM) analysis was performed to examine the relationship between the dependent variable of willingness to pay (WTP) and the independent variables. The measurement invariance test was initially utilized to validate the multi-group comparison. In order to identify the relationships in the model that were influenced by individual attributes such as age, gender, and income, individual paths were restricted to be equal in both groups for each attribute, one at a time. Because all of the variables shared a single source, the probable effects of the common method variance source were investigated. The study used a two-stage approach, so first a measurement model was estimated, and then the common method factors were added to the already developed measurement model, resulting in a nested model that allowed the chi-square difference test to justify the model.

**Table 1***Validation and Reliability of developed Model*

Constructs		Indicators	Mean	SD	Factor Loading	Cronbach's Alpha	CR	AVE
Road condition Safety Perception (RCSP)		RCSP 1	3.643	1.231	0.866	0.894	0.894	0.735
		RCSP 2	3.626	1.368	0.848			
		RCSP 3	3.571	1.289	0.867			
		RCSP 4	3.613	1.296	0.860			
Risk Perception (RP)		RP 1	3.947	1.156	0.868	0.965	0.975	0.759
		RP 2	3.863	1.229	0.869			
		RP 3	3.887	1.235	0.865			
		RP 4	3.864	1.125	0.843			
		RP 5	3.902	1.243	0.849			
		RP 6	3.879	1.148	0.872			
		RP 7	3.882	1.157	0.859			
		RP 8	3.884	1.195	0.867			
		RP 9	3.889	1.198	0.855			
		RP 10	3.881	1.191	0.861			
Road Safety Awareness (RSA)		RSA 1	3.854	1.121	0.846	0.949	0.951	0.739
		RSA 2	3.581	1.265	0.871			
		RSA 3	3.891	1.193	0.858			
		RSA 4	3.844	1.131	0.857			
Personal Norm (PN)		PN1	3.911	1.196	0.849	0.961	0.961	0.746
		PN2	3.883	1.244	0.882			
Attitude towards Responsibility (ATSR)		ATSR1	3.815	1.261	0.897	0.947	0.947	0.78
		ATSR2	3.813	1.319	0.881			
		ATSR3	3.798	1.302	0.887			
		ATSR4	3.763	1.321	0.883			
		ATSR5	3.819	1.309	0.882			
		ATSR6	3.796	1.321	0.887			
		ATSR7	3.787	1.319	0.885			
		ATSR8	3.837	1.261	0.889			
Attitude (ATD)		ATD1	3.869	1.176	0.869	0.903	0.904	0.758
		ATD2	3.792	1.271	0.858			
		ATD3	3.891	1.183	0.895			
		ATD4	3.851	1.211	0.874			
Social Norms (SN)		SN1	3.261	1.423	0.887	0.938	0.938	0.793
		SN2	3.239	1.482	0.998			
		SN3	3.243	1.421	0.893	0.892	0.893	0.737
		PBC1	3.761	1.415	0.885			



Perceived Behavioral Control (PBC)	PBC2	3.767	1.409	0.859	0.856	0.857	0.758
	PBC3	3.771	1.482	0.821			
Perceived Fairness (PF)	PF1	3.467	1.415	0.879	0.823	0.823	0.692
	PF2	3.527	1.342	0.874			
Perceived Effectiveness (PE)	PE1	3.468	1.325	0.839	0.826	0.827	0.681
	PE2	3.479	1.352	0.782			
	PE3	3.517	1.263	0.888			
	PE4	3.593	1.305	0.839			
	PE5	3.582	1.312	0.836			
	PE6	3.564	1.311	0.847			
Trust in Government (TG)	TG1	3.643	1.323	0.844	0.829	0.830	0.619
	TG2	3.626	1.318	0.841			
	TG3	3.571	1.327	0.852			
Willingness to Pay (WTP)	WTP1	3.697	1.221	0.811	0.826	0.827	0.681
	WTP2	3.778	1.243	0.754			
	WTP3	3.767	1.176	0.799			

Table 2: CFA Model discriminant Validity

	RISP	RP	RSA	PN	ATSR	ATD	SN	PBC	PF	PE	TG	WTP
RISP	0.859											
RP	0.191	0.848										
RSA	0.235	0.317	0.857									
PN	0.201	0.461	0.331	0.858								
ATSR	0.233	0.476	0.353	0.351	0.889							
ATD	0.171	0.427	0.277	0.255	0.255	0.876						
SN	0.211	0.343	0.272	0.267	0.282	0.252	0.868					
PBC	0.151	0.451	0.319	0.330	0.421	0.299	0.271	0.853				



PF	0.23 3	0.50 8	0.36 0	0.35 4	0.32 9	0.45 1	0.26 5	0.37 1	0.85 2			
PE	0.18 7	0.45 4	0.36 3	0.38 0	0.47 5	0.34 3	0.21 5	0.41 4	0.45 1	0.83 8		
TG	0.21 7	0.46 3	0.37 7	0.39 0	0.44 1	0.33 4	0.22 2	0.37 6	0.46 7	0.49 8	0.85 3	
WTP	0.42	0.56 1	0.48 5	0.48 4	0.52 6	0.44 9	0.34 3	0.54 2	0.52 4	0.51 2	0.49 1	0.78 1

Table 3: SEM results

Latent Constructs	Coefficient	SE	p-value
Road condition Safety Perception	0.205	0.047	0
Risk Perception	0.166	0.061	0.009
Awareness towards Road Safety	0.198	0.038	0.021
Personal Norm	0.176	0.044	.061
Attitude towards Safety Responsibility	0.157	0.051	0.009
Attitude	0.131	0.054	0.02
Social Norms	0.067	0.04	0.191
Perceived Behavioral Control	0.202	0.052	0.001
Perceived Fairness	0.134	0.052	0.045
Perceived Effectiveness	0.116	0.059	0.071
Trust in Government	0.176	.057	0.074

Conclusions

The TPB framework was adopted to conduct research on the psychological factors which influence WTP with the aim of improving road safety. The TPB have been included a number of additional variables, which includes perceptions of road condition safety, risk perception, awareness of road safety, personal norm, attitude for safety responsibility, perceived effectiveness, perceived fairness and trust in government. The study also explored the moderating effects of different demographic characteristic like age, gender, income, accident exposure, and driving experience on the relationship of public WTP for road safety improvements and independent variables. The purpose was to study the impact of how these factors moderate the relationship. The results from SEM model demonstrated



that all the additional variables in the extended TPB possess a significant relationship to WTP for the improvement of road safety, except for the Subjective Norm. Gender was found as moderator in between the relationship of risk perception and public willingness to pay. Age was emerged to be a moderating factor for risk perception, attitude towards safety responsibility, perceived fairness, and willingness to pay. A similar trend among perceived behavioral control and willingness to pay was observed, with income, acting as a moderator. Accident experiences moderated the relationship among risk perception, attitude towards safety responsibility, and willingness to pay. These findings have significant inferences for safety campaigns aimed at improving road safety, as well as the financial support that the general public provides for road safety programmers.

References

- Ahmed, A. J. N. R. S. S. (2007). *Road safety in Pakistan*. Islamabad.
- Chaturabong, P., Kanchanasut, S., & Suppakitpaisarn, P. (2011). Analysis of costs of motorcycle accidents in Thailand by willingness-to-pay method. *Accident Analysis & Prevention*, 2239(1), 56-63.
- Haddak, M., Le Gall-Ely, M., & Grolleau, G. (2016). Willingness-to-pay for road safety improvement. *Safety Science*, 87, 1-10.
- Hensher, D. A., Rose, J. M., & Greene, W. H. (2009). Estimating the willingness to pay and value of risk reduction for car occupants in the road environment. *Transportation Research Part A: Policy and Practice*, 43(7), 692-707.
- Hyder, A. A., & Morrow, R. H. (2000). Applying burden of disease methods in developing countries: A case study from Pakistan. *American Journal of Public Health*, 90(8), 1235-1239.
- López-Mosquera, N., García, T., & Barrena, R. (2014). An extension of the Theory of Planned Behavior to predict willingness to pay for the conservation of an urban park. *Journal of Environmental Management*, 135, 91-99.
- Qu, X. (2007). *Multivariate data analysis*. Taylor & Francis.
- Subhan, F., Khan, A. N., & Ahmed, I. (2021). Public intention to pay for road safety improvement: A case study of Pakistan. *Transportation Research Part F: Traffic Psychology and Behaviour*, 160, 106315.
- World Health Organization. (2015). *WHO global report on trends in prevalence of tobacco smoking 2015*. WHO.
- World Health Organization. (2018). *Global status report on road safety 2018*. WHO.
- Wijnen, W., Weijermars, W., & Vandenberg, S. (2016). Social costs of road crashes: An international analysis. *Accident Analysis & Prevention*, 94, 97-106.