

Impact of Gross National Happiness (GNH) on the Adoption of Green Transportation in Bhutan

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Abstract

The GNH-led Kingdom of Bhutan has over 70% of its total area under forest cover and has made an ambitious declaration to ensure that greenhouse gas emission levels do not exceed the sequestration capacity of its forests at all times. However, in the face of rapid economic development which poses serious challenges to these conscious national efforts, the nature of Bhutanese transportation behavior, which (transportation) is a problem worldwide, has not been empirically studied. The purpose of this study was to determine whether GNH domain of ecological diversity and resilience, which includes, among others, the perceptions regarding environmental challenges, urban issues and responsibilities, had any effect on green transportation behavior of the Bhutanese students. Data collected from 300 college students were analyzed using appropriate multivariate logistic regression. As observed by many earlier studies, the present study did not find any significant relationship between selected GNH domains and green transportation.

Keywords : Gross National Happiness, ecological domain, environmental behaviour, green transportation

JEL Classification : J49, Q38, Q56, Q58

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Bhutan, lately known for its distinctive development philosophy of Gross National Happiness (GNH) around the world (Bhutan is the only country to have officially adopted gross national happiness instead of the gross domestic product as the main development indicator), is one among the few countries in the world to have entered the 21st century with relatively little damage done to its environment (National Environment Commission, 2008). Bhutan has also been declared as one of the world's 10 most important biodiversity 'hotspots' (WWF). Forests account for more than 70% of the country's land cover - one of the highest in the world. Environmental sustainability is very much an integral part of GNH and Bhutan's effort towards conservation of its natural environment is tremendous. The Constitution of Bhutan mandates that at least 60% of the country is maintained under forest cover at all times. Consequently, as a result of the vast forest cover and limited number of polluting industries, Bhutan has been recognized as one among the few countries in the world with net greenhouse gas (GHG) emissions in negative (Royal Government of Bhutan, 2012).

However, the conservation and sustainability of natural environment in Bhutan, like it is in any other country, is not without challenges. Indeed, there is already evidence of mounting pressures on the environment, fuelled by a complex array of forces (Planning Commission, 1999), out of which the present study focuses only on the transportation sector. The use of automobiles contributes to serious environmental problems, including global warming, acid rain, resource depletion, noise pollution, and congestion (Lowe, 1990). According to Salimifard, Shahbandarzadeh, and Raesi (2012), the global CO₂ emissions from the transportation sector grew by 45% from 1990 to 2007, and are expected to continue to grow by approximately 40% from 2007 to 2030. Likewise, in

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Bhutan, a survey on air pollution in Thimphu carried out in 1999 by NEC identified vehicle emissions as one of the biggest causes of air pollution (Asian Development Bank, 2006). Moreover, the study warned that vehicular emissions are a growing problem as the number of vehicles is increasing rapidly. The number of motor vehicles in Bhutan has grown at an astonishing pace; from 11,916 in 1990 to 19,463 in 2000, and to 62,697 as of December 2011. This translates to 88 motor vehicles per 1,000 people or 1 motor vehicle for every 11 people in the country. As per the 2000 base-year data, the National GHG Inventory in the Second National Communication projected that the transport sector emitted 118.11 Gg of CO₂ equivalent, accounting for about 45% of all energy-related emissions and about 7.6% of the total GHG emissions of Bhutan (Royal Government of Bhutan, 2012).

For all these reasons, the Royal Government is formulating a sustainable transport strategy such as introducing green modes of transportation, development of electric tram network for public transport, improvement of the public bus transport system in the urban centers in terms of safety, service, and coverage to reduce the dependency on private cars and friendlier options such as electric buses, development of cable cars and ropeway systems for remote settlements, improvement of road communication network to shorten travel time, and cutting down the costs of transportation of public goods and services. Furthermore, in December 2009, during the Copenhagen Climate Change Conference, the Royal Government of Bhutan issued a declaration entitled “Declaration of the Kingdom of Bhutan - The Land of Gross National Happiness to Save our Planet” wherein the government committed to maintain Bhutan's status as a net sink for greenhouse gases by ensuring that greenhouse gas emission levels do not exceed the sequestration capacity of its forests (Royal Government of Bhutan, 2012).

At the backdrop of impressive natural wealth and Bhutan's ambitious declaration to save the planet, the present study is a modest attempt to uncover whether the GNH measure of ecological diversity and resilience has any impact on an individual's intention and behavior towards green transportation so that it can help determine whether the selected GNH domain can act as a tool to check people's environmentally-conscious consumption behavior, particularly in terms of green transportation. Björklund (2011) defined green transportation as transportation services that have a lesser or reduced negative impact on human health and the natural environment when compared with competing transportation services that serve the same purpose.

Literature Review

Gross National Happiness (GNH) is a term coined by His Majesty, the Fourth King of Bhutan, Jigme Singye Wangchuck in the 1970s. The noble concept infers that sustainable development should take a holistic approach towards notions of progress and give equal importance to non-economic aspects of well being (Ura, Alkire, Zangmo, & Wangdi, 2008). The concept of GNH has often been explained by its four pillars: good governance, sustainable socioeconomic development, cultural preservation, and environmental conservation. Later, this was further classified into nine domains and 33 indicators.

Gross National Happiness is a development approach that seeks to achieve a harmonious balance between economic development and environmental conservation. It holds that development with a negative impact on the environment is not development. At the same time, environmental issues are also attracting a major attention all over the world. Consequently, with the increasing awareness of environmental issues, the level of consciousness and concern about the environment is rising in many countries. Kim and Choi (2005) also agreed that public concern for environmental issues has gradually but steadily increased over the past three decades since the inception of Earth Day, appealing to all people of the world to preserve nature and biodiversity. On the other hand, human activities are increasingly causing irreparable harm to the natural environment. The number of motorized vehicles in the world grew from about 75 million to about 675 million between 1950 and 1990, of which around 80% of these vehicles were primarily used for personal transportation (Mairesse, Macharis, Lebeau, & Turcksin, 2012). The study mentioned that increasing car use has generated various environmental, social, and economic problems. Among other problems, environmental problems are concerned with the emissions of toxic and harmful substances which contribute to global warming, smog, and acid precipitation.

A seemingly straightforward approach to reduce the impact of transport on the environment is to reduce the use

of personal transportation by means of conventional diesel and petrol vehicles in favor of bicycle and public transport use (Purcher & Renne, 2003). There are yet numerous alternative ways and means by which the transport sector can reduce its environmental harm which Björklund (2011) termed as green transportation. This is an opportunity to test individuals' responsibility towards the natural environment. However, many studies have found that concerns do not automatically translate into conscious environmental behavior. For instance, in the U.S., it was reported that only a few “green” products have been successful (Reitman, 1992) despite a vast majority of consumers reporting that their purchases were influenced by environmental concerns (Chase & Smith, 1992 ; Kim & Choi, 2005). Likewise, Mairesse et al. (2012) also found out that most consumers are in favor of a car with a good environmental performance, but during the purchase process, other factors play a more important role such as quality, financial aspects, and the overall driving experience. Many studies support this fact and thus, it was discovered that the environment was the lowest rated issue when purchasing a vehicle (Gould & Golob, 1998 ; Kurani, Heffner, & Turrentine, 2007 ; Turrentine, Sperling, & Kurani, 1992 ; Turrentine & Kurani, 1995). Even people who belong to environmental organizations do not express higher purchase intentions for green cars (Turrentine et al., 1992).

Nonetheless, according to the study by Mairesse et al. (2012) , the authors found that the consumers with a stronger concern for the environment are more likely to purchase products as a result of their environmental claims than those who are less concerned about the environmental issues. Similarly, a positive association between ecological knowledge and environmentally responsible behavior was also found by Dispoto (1977) and Kilkeary (1975).

Objective of the Study

The present study was conducted to determine whether the GNH domain of ecological diversity and resilience has any impact on a person's intention and behaviour towards adopting “green” transportation.

Methodology

The study is an exploratory research carried out at a premier government management college located in Bhutan. A sample of 300 respondents, that is, college students were asked to participate in the study in March 2013. Data collected through the questionnaire method were analyzed using descriptive and multinomial logistic regression with the help of SPSS version 19. Out of the total respondents, 51% of the respondents were men and 49% of the respondents were women. Majority of the respondents resided in the rural part of the country (54.4%), while only 26.1% and 19.5% of the respondents resided in the urban and sub-urban areas respectively.

Analysis and Results

★ **Independent and Dependent Variables :** GNH indicators were taken as the independent variables for the study. The environmental domain, that is, ecological diversity and resilience includes three subjective indicators related to perceptions regarding environmental challenges, urban issues and responsibilities, and one more objective indicator, which is related to wildlife damage to crops (Ura et al., 2012). The fourth indicator was not considered for the study since it was not relevant to the present respondents. The study made use of the GNH Survey Questionnaire 2010.

Dependent variables for the study included the measures for green transportation behavior. Green transportation behavior, for the purpose of the study, refers exclusively to an individual's preferred choice for greener mode of transport (which includes walking) and greener vehicular transport (among different types of vehicle transport classified based on their negative harm to the environment, that is, public transport buses, taxis, and private vehicles respectively). It also includes an individual's vehicle purchase intention and the respondents' probable rating for factors that would affect their purchase decisions.

★ **Relationship Between GNH and Green Transportation Behavior** : The hypotheses for the study were that GNH indicators had a positive impact on the respondents' green transportation behavior. To test the hypotheses, the study employed binomial and multinomial regression model depending upon the type of data of the dependent variables. The statistical tests are based on the following logistic model and were conducted using SPSS version 19.

$$\ln \left(\frac{\text{Prob (event)}}{(1 - \text{prob (event)})} \right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k$$

In the above model, $x_1, x_2, \dots x_k$ refer to the independent variables and $\beta_0, \beta_1, \dots \beta_k$ refer to their coefficients. The quantity to the left of the equal sign is called a logit. It is the log of the odds that an event occurs. The coefficients in the logistic regression model indicate how much the logit changes based on the values of the predictor variables.

While applying the statistical test, all hypotheses were found to be insignificant and the model did not find any significant relationship between ecological issues, urban issues, environmental responsibility, and a person's green transportation behavior. Respondents expressed major concerns over the environmental issues in their community, but they were more inclined towards transport behaviour that poses greater risk for environmental damage, such as traveling more using personalized vehicles rather than using public transport (buses) ; they were reluctant to walk or commute, and were more desirous of owning a car. These findings are perfectly in line with many earlier findings discussed in the literature review. Mairesse et al. (2012) cited in their study that majority of the consumers reported positive attitudes toward the environment and expressed a general concern about the environmental impact of car use, but this did not reflect in their consumption behaviour. McKinsey & Company found that 87% of the consumers were concerned about the environmental impact of the products they bought; however, only 33% of those same consumers indicated they were ready to or had made green product purchases (as cited in Huge-Brodin, 2012). This discrepancy between environmental attitude and behavior is also known as the attitude-action gap (Lane & Potter, 2007). Tedeschi, Cann, and Siegfried (1982) and Mo and Wong (n.d.) also observed a similar attitude in case of American respondents. Despite they being concerned about the quality of the environment, they were unwilling to accept individual responsibility for pollution and thus were unwilling to undertake individual action that could reduce environmental damage. For such controversial behaviour, Blake (1999) argued that many individuals feel that one person should not be responsible for the health of the environment or that one person's actions cannot make a difference, leading many people to not adopt environmental friendly behavior.

Regarding the purchase intention, 83% of the respondents had a desire to buy vehicles. Bhutan today has a ratio of around 1:11 vehicles per person from around 1:13 in 2010. It is important to note that the vehicle population in the country has increased dramatically over the years. The respondents were also asked to weigh the factors that they might take into consideration when deciding upon their choice of a vehicle. The factors that were identified as having a significant influence on vehicle purchase intention are purchase price, operating cost, quality, socioeconomic attributes, and environmental performance (Choo & Mokhtarian, 2002; Evangelista, Huge-Brodin, Isaksson, & Sweeney, 2012; Potoglou & Kanaroglou, 2006). The mean scores for the respective factors are as shown in the Table 1 (total score for each factor will vary from 1 to 5; 1 being the *least important* and

Table 1: Factors Affecting Purchase Decision of Automobiles

Purchase influencing Factors	Mean
Purchase Price	3.93
Operating cost (mileage, maintenance)	3.04
Vehicle quality (reliability, comfort, safety and workmanship)	3.42
Socioeconomic attributes (lifestyle image, social or professional status)	2.34
Environmental performance (harmful emissions, noise pollution)	2.27

Table 2. Home-Town and Mode of Choice of Mode of Transport(%)

Home Town	Within .5 Km			Between .5-1 Km			Between 1-2 Km			Between 2-3 Km			More than 3 Km		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Rural	3.2	0	96.8	11.3	1.6	87.1	26.6	3.2	70.2	51.2	7.3	51	74.6	6.9	18.5
Urban	0	3.4	96.6	15	5	80	51.7	5	43.3	81.4	3.4	15.3	87.1	3.2	9.7
Sub- Urban	13.3	0	86.7	8.9	4.4	86.7	40.9	2.3	56.8	63	10.9	26.1	76.1	7.1	14.7

1= mode of travel : by vehicle, 2=mode of travel : by bicycle, 3= mode of travel : by walking

5 being the *most important*).

From the Table 1, it is evident that the respondents who expressed high concern and responsibility towards environmental issues gave the lowest rating to environmental performance (while making a purchase decision), which refers to harmful emissions, noise pollution, and so forth emitted by a vehicle. Most empirical studies (Gould & Golob, 1998 ; Kurani & Turrentine, 1995; Kurani, Turrentine, & Sperling, 1996 ; Turrentine et al., 1992) have found that people have a strong concern for the environment and a strong belief that lifestyle changes are desirable to solve environmental problems, yet they discovered that environment was the lowest rated issue when purchasing a vehicle. Even people who belonged to environmental organizations did not express higher purchase intentions for green cars (Turrentine et al., 1992). This may also be the same reason why the market share of alternative fuelled vehicles (AFVs) and environmentally fuelled vehicles remains quite limited.

*** Relationship Between Demographic Factors and Green Transportation Behavior :** The study also hypothesized that demographic factors namely, gender and hometown also had a significant impact on the transport behavior of the respondents. Other variables such as age, semester (in which semester the students were studying), and family background were excluded for having a high proportion of homogeneous data. Demographic variables were used as independent variables to test this relationship. It was found that the nature of the hometown (i.e., rural, urban, or suburban area) had a significant impact on the students' choice of vehicular transport for travelling longer distances (Table 2).

Students from urban places were more likely to travel by private vehicles than using public buses as compared to students from rural and suburban places. Likewise, for shorter distances (between 1-2 km), where walking was also an option, rural students were more used to walking, that is, 70.2% of the respondents preferred walking as compared to 43.3% and 56.8% of respondents from urban and suburban hometowns respectively. Significant difference among the respondents - classified on the basis of their hometown with regards to their mode of transportation within a radius of 2-3 kilometers - was also observed. It was observed that 51% of the rural, 15.3% of the urban, and 26.1% of the suburban students respectively used walking as a major mode of transportation ; 70.2% of the rural students chose to walk within the specified radius of 1-2 kilometers within the last 12 months. This is a very impressive finding since a majority of the Bhutanese people (69%) dwell in the rural parts of the country.

The presence of a relationship between the dependent variable and combination of independent variables is based on the statistical significance of the final model chi-square given in the SPSS tables titled "Model Fitting Information" (significance level=5%) (refer to Tables 3 - 9).

Policy Implications

The study has important ramifications for public policy makers. This concerns the importance that society places on an individual's actions and the consequences of the same. In order to increase (or bring about) a sense of environmental responsibility among the citizens, the policy makers need to apply normative pressure, that is, set an example for the society to follow. Governmental intervention through various measures to reduce and control the negative impact of the transport sector on the environment is recommended. However, further research needs to be carried out in this area. The present state of the transport system in terms of its environmental score, the

Table 3. Test Statistics for Hypothesis 1

Model	Model Fitting Information			
	Model Fitting Criteria		Likelihood Ratio Tests	
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	25.751			
Final	20.789	4.962	4	.291

H1 : There is a significant relation between environmental responsibility and choice for greener vehicular transportation for long distance travel.

Result: H1 is rejected.

Table 4. Test Statistics for Hypothesis 2

Model	Model Fitting Information			
	Model Fitting Criteria		Likelihood Ratio Tests	
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	192.858			
Final	167.274	25.584	33	0.818

H2: There is a significant relation between environmental issues and car purchase intentions.

Result: H2 is rejected.

Table 5. Test Statistics for Hypothesis 3

Model	Model Fitting Information			
	Model Fitting Criteria		Likelihood Ratio Tests	
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	268.525			
Final	226.625	41.899	33	0.138

H3: There is a significant relation between ecological issues and greener mode of vehicular transportation for short distance travel.

Result: H3 is rejected.

Table 6. Test Statistics for Hypothesis 4

Model	Model Fitting Information			
	Model Fitting Criteria		Likelihood Ratio Tests	
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	201.773			
Final	167.284	34.489	24	0.076

H4: There is a significant relation between urban ecological issues and greener mode of vehicular transportation for long distance travel.

Result: H4 is rejected.

Table 7. Test Statistics for Hypothesis 5

Model	Model Fitting Information			
	Model Fitting Criteria		Likelihood Ratio Tests	
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	173.967			
Final	146.902	27.065	24	0.301

H5: There is a significant relation between urban ecological issues and greener mode of vehicular transportation for short distance travel.

Result: H5 is rejected.

Table 8. Test Statistics for Hypothesis 6

Model	Model Fitting Information			
	Model Fitting Criteria		Likelihood Ratio Tests	
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	98.358			
Final	86.456	11.903	12	0.454H

H6: There is a significant relationship between urban ecological issues and greener mode of transportation for travelling between 1 km to 2 km.

Result: H6 is rejected.

Table 9. Test Statistics for Hypothesis 7

Model	Model Fitting Information			
	Model Fitting Criteria		Likelihood Ratio Tests	
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	78.633			
Final	72.57	6.063	12	0.913

H7: There is a significant relationship between urban ecological issues and intention to purchase a car.

Result: H7 is rejected.

status of commuting environment and public transport services, scope and market for AFVs, and so forth may be useful to gauge the future of transport system in Bhutan, and its effect on the natural environment of the kingdom.

Conclusion

It was observed that GNH's indicators of environmental domain did not share any significant relation with the students' behavior and intention towards green transportation. It is also notable that environmental performance was the least important factor affecting their purchase decisions. However, it cannot be generalized that GNH does not have any effect on the green transportation behavior since the study did not take into account the other aspects of this holistic concept. The three indicators represent only 9% percent of the total 33 indicators. Moreover, the sample includes only college students, hence they may not be a good representative of the whole Bhutanese population, where a majority of the people have not gone to college. With regards to the demographic factors, rural students were found to be more inclined towards sustainable modes of transportation. Hence, Bhutan needs to make greater efforts to sustain a marriage between ecological sustainability and green transportation.

Limitations of the Study and Scope for Further Research

Due to the limited sample frame, sample size, and low coverage due to time and financial constraints, there may be a chance of non accuracy in the results. Our research mainly depends upon primary data, and the results are based upon the responses given by the respondents, which may not be accurate. Being the first study on the said topic in Bhutan, we could not get any secondary data and literature for the study specifically related to the country. Lack of public information on green transportation and no proper documentation on the methodology of the study is another limitation of the present study. However, researchers can consider the following suggestions to extend the study in the future:

- (1) The findings and limitations of this study suggest the need for additional research into the government's adoption of green transportation for inclusive growth for better community design, transportation, and housing innovations that could benefit all sections of the society in Bhutan.
- (2) The research was carried out in one section of the society, that is, the youth. Hence, in the future, the research can be extended to consider people from different sections of the society.
- (3) Future studies can work out how the people of Bhutan can be encouraged to adopt and use green transportation so that the natural wealth of the pristine country remains protected for generations to come.

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