SAWADDEE KA

GOOD MORNING

KUZU ZANGPO

ATRANS SYMPOSIUM

RISK ANALYSIS AND MANAGEMENT: A CASE STUDY ALONG PHUENTSHOLING - THIMPHU HIGHWAY

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OVERVIEW

- Introduction
- Literature review
- Methodology
- Objectives
- Types of losses
- Conclusion and Recommendations

INTRODUCTION

• Land transportation is the only means of communication in Bhutan.

- Two highways, namely, Thimphu-Phuentsholing highway (AH48) and Thimphu-Trashigang highway are the two important highways.
- The earlier researchers have found that Thimphu–Phuentsholing Highway is the most important highway and the most critical highway in terms of road blockages.

INTRODUCTION CONTD.

- Thimphu-Phuentsholing highway is the main route for travelling and transportation of goods.
- The observation and media reports indicated that road blockages and accidents are of concern to the society.
- The study includes both road blockages and accidents for risk analysis.

LITERATURE REVIEW

- Sato. Y et al., (2005) defines risk as a factor of change causing social loss and impede the achievement of a goal.
- Cheki. D & Shibayama. T, (2007) defines risk as the combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.
- Risk management is the act or practice of dealing with or controlling the risk.

CONTD.

- A stepwise process consisting of *risk assessment* and *risk control*.
- risk assessment further consists of the risk analysis and risk evaluation
- risk control consists of the risk decision and risk monitoring
- A Road accident is defined as an accident which occurred as a result of the vehicle being in a state of motion on the road and causing injury to a person.

OBJECTIVES

- The main objective of the study is to determine the risk on the roads and its socio economic impact.
- The other specific objectives are to:
- Determine the risk along the road
- Determine the losses due to accidents and road blockages
- Determine the effect of the risks on the society
- Determine the effect of the risks on the economy of the country
- Develop efficient road operation management system.

METHODOLOGY

• Data collection and Data analysis

• Identification of risks

DATA COLLECTION

- From different traffic police branches (Phuentsholing, Thimphu, Chukha and Gedu)– types of accidents, its causes and the types of vehicle involved.
- From Revenue and Customs (at Rinchending check-post)— types, quantities, rate and amount of goods
 - Location of goods being transported



AREA





CAUSES OF THE ACCIDENTS





Percentage of accidents due to different causes

DEATH AND INJURIES CAUSED BY ACCIDENTS



LOSS DUE TO ROAD BLOCKAGE

- Most of the goods are being transported from Phuentsholing as it is the only dry port.
- All construction materials for the mega power project constructions and other construction activities are transported through Thimphu-P/ling highway.
- P/ling-Thimphu highway has the highest volume of passenger bus transport and other vehicles.
- Road Blockage will delay goods and construction activities.

BLOCKAGES AT DIFFERENT LOCATIONS



(Based on traffic police data from 2004 to 2009)

GOODS TRANSPORTED TO DIFFERENT DZONGKHAGS



Types of goods

Goods transported to different dzongkhags

RISK ANALYSIS

- Losses due to road blockages
- Total number of hours blocked in a year = 387 hours
- Total days blocked in a year = 387/24 = 16.125 days
- Rate of blockage per day = 16.125/364 = 0.0443

RISK ANALYSIS CONTD.

Name of route	Total days blocked in a year (1)	Rate of blockage per day (2)	e Total traffic volume per day (3)	Tota ve volu	l heavy hicle me per lay (4)	v lc (5)	Total rehicle oss per day =(2)*(3)	Heavy vehicle loss per day (6)=(2)*(4)
Sorchen – Jumja	16.125	0.0443	1018	2	226	4	5.097	10.012
Name of route	Heavy D vehicle loss per day (no.) (A)	istance (km) (B)	Freight per da (Nu) C=(A*B)*	loss y 6.53	Amour of good per da (Nu) (D)	nt ls y	Fare loss per day (E)	Total loss (Nu) (C+D+E)
T/phu- P/ling	10.012	179	11703	3	504661	59	202996	50,680,858

Total loss due to road blockage = Nu. 50.68 million

RISK ANALYSIS CONTD.

• Losses due to accidents
• Total traffic volume per day = 1018 nos

Year	No. of	total traffic	Length	Accident rate
	accidents	volume per day	(L)	A _r =
	(A)	(V)	(km)	(A/(365*V*L)*10 ⁶)
2009	99	1018	179	1.488

• Accident rate for the year 2009, $A_r = 1.488$

RISK ANALYSIS CONTD.

• Probability of loss due to accident

- =Total fare loss per day*Freight loss*A_r
- = (202996 + 11703)*1.488
- = Nu. 319,472.112 = Nu. 0.32 million
- Total loss per day due to accidents and road blockage = (0.32+50.68) = **Nu. 51 million**
- Bhutan's GDP per day = Nu. 434.92 million
- Due to accidents and blockage,
 - Percentage loss = (51/434.92)*100
 - = 11.73% of GDP per day

CONCLUSION

- Road accident and road blockage are identified as main risks along Phuentsholing-Thimphu highway.
- Socio-economic effects of the risk along study area was conducted through the analysis.

CONCLUSION CONTD.

• Accident-prone areas are identified:



CONCLUSION CONTD.

- Main reason for the accidents was indicated as human error, followed by the natural calamities
- The reasons for causing road blockage was identified mainly due to heavy rainfall, unstable slope and highway construction.



CONCLUSION CONTD.



• The total loss of Nu. 51 million per day (11.73%) of GDP loss per day) was estimated.

RECOMMENDATIONS

- To reduce accidents, educate the road-users about traffic rules and regulations through public awareness.
- Strict implementation of traffic rules and regulations with proper speed limits and sign boards.
- To manage the road safety, form a group to investigate about the road blockages.
- To prevent soil erosion, plantation of trees must⁷ be done and good quality retentions must be built.

RECOMMENDATIONS CONTD.

• For water management, proper drainage must be provided.

• Machines used must be environmental friendly.

• Safety rails to be provided along with the construction of roads.

• As Bhutan lies in an earthquake-prone zone, all road design and construction to be based on seismic design practices.

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