

National Transport Policy 2017

POLICY PROTOCOL REPORT

FINAL DRAFT

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Abbreviations

AA	American Airlines
AAI	Airport Authority of India
ADB	Asian Development Bank
AH	Asian Highway
ALoSP	Acceptable Level of Safety Performance
ASA	Air Service Agreement
ASEAN	Association of Southeast Asian Nations
ATM	Air Traffic Management
AVI	Automatic Vehicle Identifiers
BACS	Bhutan Automated Customs System
BANR	Bhutan Air Navigation Regulations
BAU	Business As Usual
BBIN	Bangladesh, Bhutan, India, Nepal
BCAA	Bhutan Civil Aviation Authority
BCCI	Bhutan Chamber of Commerce and Industry
BCP	Border Crossing Point
BIMSTEC	Bay of Bengal Initiative for Multi-sectoral Technical and Economic Cooperation
BRT	Bus Rapid Transit
BRT	Bus Rapid Transit
BRTS	Bus Rapid Transit System
BS	Bharat Stage
BSB	Bhutan Standards Bureau
BST	Bhutan Sales Tax
BTILS	BIMSTEC Transport Infrastructure and Logistics Study
CAA	Civil Aviation Authority
CAAC	Civil Aviation Administration of China
CAGR	Compound Annual Growth Rate
CAI	Canadian Airlines International
CCTV	Closed-Circuit Television
CMR	Convention on the Contract of International Carriage of Goods by Road
CO2	Carbon Dioxide
CoE	Certificate of Entitlement
CREMA	Concesión de Rehabilitación y Mantenimiento
DBFOT	Design, Built, Finance, Operate, and Transfer
DCA	Department of Civil Aviation
DDM	Department of Disaster Management
DES	Department of Engineering Services
DFR	Design for Reliability

DGCA	Directorate General of Civil Aviation
DHS	Department of Human Settlement
DME	Distance Measuring Equipment
DNB	Department of National Budget
DNV	National Directorate of Roads of Argentina
DOA	Decade of Action
DoAT	Department of Air Transport
DoR	Department of Roads
DOT	Department of Transport
DR&C	Department of Revenue & Customs
DST	Department of Surface Transport
DTE	Department of Technical Education
DTMP	Dzongkhag Transport Master Plan
DUDES	Department of Urban Development and Engineering Services
EASA	European Aviation Safety Agency
EDI	Electronic Data Interchange
EGNOS	European Geostationary Navigation Overlay Service
ERP	Electronic Road Pricing
EU	European Union
EV	Electric Vehicles
EWH	Eastern Western Highway
EXIM	Export-Import
FAA	Federal Aviation Administration
FFP	Frequent-Flier Program
FSI	Floor Space Index
FTA	Finnish Transport Agency
FY	Financial Year
GAGAN	GPS Aided GEO Augmented Navigation
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GNH	Gross National Happiness
GNHC	Gross National Happiness Commission
GNSS	Global Navigation Satellite System
GOI	Government of India
GPS	Global Positioning System
GSAT	Geosynchronous Satellites
HDI	Human Development Index
HF	High Frequency
HPEC	High Powered Expert Committee
HR	Human Resource

HV	Heavy Vehicles
I/M	Inspection and Maintenance
IAHE	Indian Academy of Highway Engineers
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICE	Internal Combustion Engine
ICT	Information and Communications Technology
ICTSL	Indore City Transport Services Limited
IDFC	Infrastructure Development Finance Company
IFC	International Finance Corporation
IFI	International Financial Institutions
INDC	Intended Nationally Determined Contributions
INRES	Indian Reference Stations
IOSA	IATA Operational Safety Audit
ISO	International Organization for Standardization
ITS	Intelligent Transport Systems
IVS	In-Vehicle Systems
JICA	Japan International Cooperation Agency
LAN	Línea Aérea Nacional
LCS	Land Customs Station
LDC	Least Developed Country
LPI	Logistics Performance Index
LTA	Land Transport Authority
LV	Light Vehicles
MCA	Model Concession Agreement
METL	Ministry of Equipment, Transport and Logistics
MFN	Most Favored Nation
MLCP	Multi-Level Car Parks
Mn	Million
MoAF	Ministry Of Agriculture And Forests
MoEA	Ministry of External Affairs
MoF	Ministry of Finance
MOH	Ministry of Health
MOH	Ministry of Highway
MoHCA	Ministry of Home and Cultural Affairs
MoIC	Ministry of Information & Communications
MoLHR	Ministry of Labor & Human Resources
MoLIT	Ministry of Land, Infrastructure and Transport
MOP	Ministry of Public Works
MoRTH	Ministry of Road Transport and Highways
MoTC	Ministry of Transport and Communication

MoU	Memorandum of Understanding
MoWHS	Bhutan Ministry of Works and Human Settlement
MSAS	MTSAT Satellite Augmentation System
MTSAT	Multi-functional Transport Satellite
MTT	Ministry of Transport and Telecommunications
MU	Million Units
MV	Motor Vehicle
MV	Medium Vehicles
MVA	Motor Vehicles Agreement
NAU	National Aviation University
NEC	National Environment Commission
NECS	National Environment Commission Secretariat
NEWH	Northern East-West Highway
NHAI	National Highway Authority of India
NLCS	National Land Commission Secretariat
NM	Nautical Mile(s)
NMT	Non-Motorized Transport
NO	Nitrogen Oxide
NSB	National Statistics Bureau
NTDPC	National Transport Development Policy Committee
OD	Origin-Destination
OFC	Optic Fiber Cable
PFMA	Public Financial Management Act
PIA	Paro International Airport
PM	Particulate Matter
PND	Portable Navigation Devices
PNH	Primary National Highway
PoS	Point of Sale
PPA	Passengers per Annum
PPP	Public Private Partnership
PRS	Provide Research Support
PT	Public Transport
RBHSL	Royal Bhutan Helicopter Services Limited
RBP	Royal Bhutan Police
RBP	Royal Bhutan Police
RCSC	Royal Civil Service Commission
RGOB	Royal Government of Bhutan
RPAS	Remotely Piloted Aircraft Systems
RPV	Remotely Piloted Vehicles
RRP	Rural Roads Project
RSMP	Review of Road Sector Master Plan

RST	Road Safety & Transport
RSTA	Road Safety & Transport Authority of Bhutan
RSTA	Road Safety & Transport Authority
RTA	Regional Transport Authority
SA	Safety Assurance
SAARC	South Asian Association for Regional Cooperation
SAARC	South Asian Association for Regional Cooperation
SAFTA	Agreement on South Asian Free Trade Area
SANRAL	South African National Roads Agency
SAPTA	Agreement on SAARC Preferential Trading Arrangement
SAR	Search and Rescue
SASEC	South Asia Sub-regional Economic Cooperation
SASEC	South Asia Sub-regional Economic Cooperation
SATIS	SAARC Agreement on Trade in Services
SBAS	Satellite -Based Augmentation Systems
SDG	Sustainable Development Goals
SEWH	South East-West Highway
SloCaT	Sustainable Low Carbon Transport
SMS	Short Message Service
SMS	Safety Management System
SNH	Secondary National Highway
SO2	Sulphur Dioxide
SOE	State Owned Enterprises
SRM	Safety Risk Management
SSP	State Safety Programme
TCB	Tourism Council of Bhutan
TDM	Topography and Deformation Measurement
TEU	Twenty foot Equivalent Unit
TIR	Total Indicator Runout
TOD	Transit Oriented Development
TOT	Toll-Operate-Transfer
TSP	Thimphu Structure Plan
UAE	United Arab Emirates
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicles
UK	United Kingdom
ULB	Urban Local Bodies
UN	United Nations
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCAP	United Nations Economic and Social Commission for Asia Pacific

UNFCCC	United Nations Framework Convention on Climate Change
UNRSC	United Nations Road Safety Collaboration
USA	United States of America
UT	Urban Transport
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Omnidirectional Range
VPD	Vehicles Per Day
VQS	Vehicle Quota System
WAAS	Wide Area Augmentation System
WHO	World Health Organization
WTO	World Trade Organization

Chapter 1: Introduction

1.1. Background and Context

The Kingdom of Bhutan is located in the eastern Himalayas. The geographic spread of the country is 38,394 sq.km with an estimated population of around 770,000, of which nearly 60 percent live in rural areas. Bhutan is landlocked, bordered to the north by Tibet region of China and to the west, south and east by India. The topography is uneven characterized by high mountains and dense forests. With about 70 percent of the Kingdom is covered with forests, the country has been able to preserve its ecosystem.

Over a period of time, Bhutan has transformed itself from a virtually closed society into a reasonably open economy that aspires for significant economic and socio-economic development. The country's growth and poverty reduction strategy is underpinned by a unique national philosophy based on the concept of Gross National Happiness (GNH). The GNH strives to balance spiritual and material advancement and is organized around four pillars: sustainable and equitable economic growth, good governance, the preservation and sustainable use of the environment and Bhutan's rich cultural heritage, values and emotional needs. These four pillars embody the guiding principles for national policies in Bhutan.

Bhutan has enjoyed significant progress in promoting human development. With a human development index (HDI) value of 0.607, Bhutan ranks 132nd among 188 countries and is one of the few "least developed countries" (LDCs) that fall in the category of medium human development countries¹. The distribution of income in Bhutan is relatively unequal, with a Gini index of 38.8².

Since the early 2000s, sustained growth in Bhutan has been fueled by the rapid expansion of the secondary sector, particularly hydropower development. Tourism industry is another key driver of the Bhutanese economy. The share of agriculture's contribution to GDP has declined steadily over time, down to 17.4 per cent in 2015. However, the agricultural sector remains the main source of livelihood and income for the majority of the population. Overall, Bhutan's economy grew 6.4% in year 2016 and is projected to accelerate at 8.2% in 2017 and 9.9% in 2018 as per ADB's economic outlook.

Given the strong dependence of Bhutan's economy on trade and tourism, it is important that the country has a strong network of roads and surface transport system. Availability of efficient and affordable transport not only improves day-to-day convenience for people but plays a critical role in improving productivity, reducing transaction costs, thus giving an overall positive thrust to the economy.

¹ Human Development Report 2016 by UNDP

² World Bank

It is therefore pertinent that transport systems is developed in a way that is accessible and affordable to all. A system that is not only safe for movement of passengers and goods but also responsive to the rapidly changing economic environment. It is equally important for the sector to be environmentally sustainable and sensitive about its contribution to emission.

Transport plays an extremely critical role in addressing the Sustainable Development Goals (SDGs) developed by the United Nations. According to a paper published by UN, transport related targets are included in eight out of the seventeen proposed SDGs (Goals 2, 3, 6, 7, 9, 11, 12, 13) and it thus illustrates the cross cutting role that transport has in sustainable development. The list of transport related SDGs and targets can be seen in the figure below.

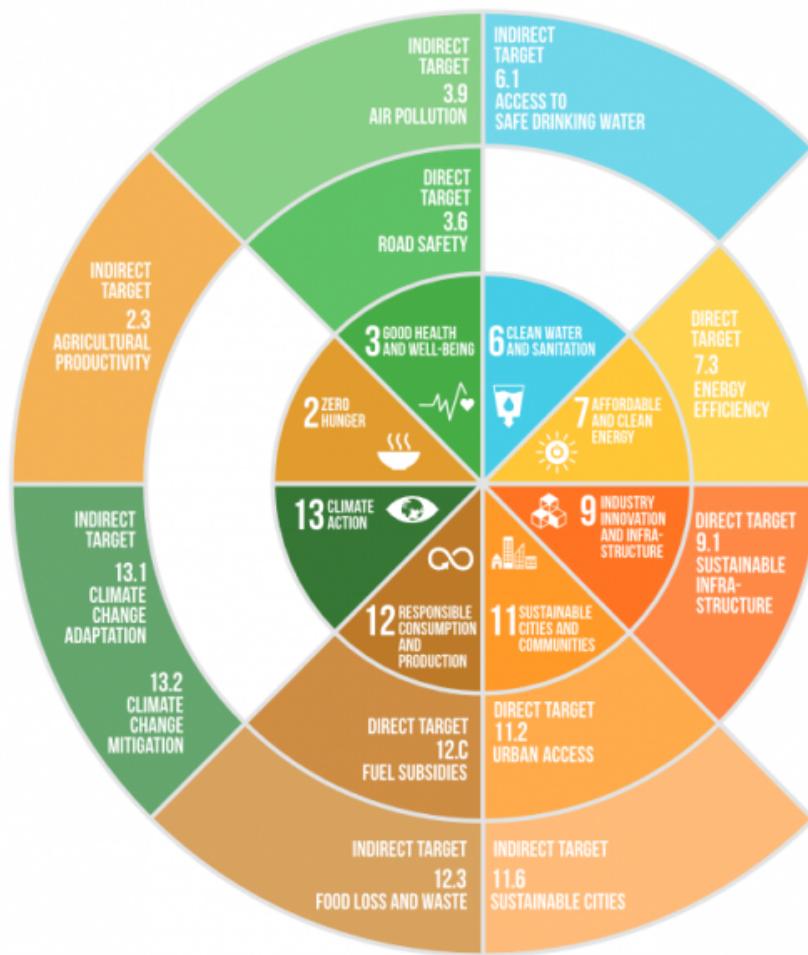


Figure 1:
Transport

related SDGs and targets

Source: Sustainable Low Carbon Transport (SloCaT), 2015

As Bhutan moves into a higher growth trajectory, the drivers of growth will lead to higher requirement of intercity and intra city travel facilities, improved roads, increase in aviation traffic, higher freight movement across borders and within the country. Economic prosperity will lead to higher ownership of private vehicles which will contribute to higher levels of emission. The urban centers will become more congested and will require

efficient land use planning that is focused on public as well as non-motorized transportation. Augmentation of tourism will involve creation of new tourism magnets across Bhutan which needs to be achieved through better regional air connectivity and better, faster and safer new roads as well as alternative modes of transport. In a nutshell, transport growth must be commensurate to the economic growth and should act as an enabler to the overall socio-economic development.

To enable such growth, Bhutan shall need a transformative approach. The country's long-term strategic vision of the development of the transport sector to the year 2040 is guided by the document "Bhutan Transport 2040 Integrated Strategic Vision", prepared in year 2011. This document comprises an overall goal, supporting objectives, and a series of integrated strategies to guide government policy and investment planning. The strategies for road network development, road transport, urban transport, civil aviation, regional connectivity and overall transport sector management are explicitly laid out and adopted by RGOB. A series of transport sector specific initiatives undertaken since then are a result of the guidance provided by this document.

While the country's vision and strategies for transport, developed through extensive consultations with all relevant stakeholders, are therefore comprehensive, the same cannot be said about Bhutan's existing transport policy. This policy was prepared in 2006 and has several shortcomings. The current transport policy is incomplete and does not adequately address new requirements and challenges, including those which contribute to the attainment of the SDGs 2030. The document doesn't provide a perspective on the challenges faced by each sub-sector of transport and therefore the path towards policy formulation is not clear. For instance, RGOB's policy on road network development as well as its preservation and management finds no mention. The policy instruments through which accessibility should be improved are not provided. Conservation of environment plays a central role in Bhutan's approach towards economic development. However, the Transport Policy 2006 doesn't provide policy measures through which a systematic reduction of emissions can be achieved. Within urban transport, congestion is a major area of concern for urban centres like Thimphu and Phuentsholing. The policy doesn't provide the measures through which the urban centres can be decongested. The governance mechanism, the institutions on which the effectiveness of various policy interventions rest are also not mentioned.

The ramifications of an incomprehensive transport policy are significant and have already started showing in various issues that have surfaced in Bhutan's transport sector. Some of them include unprecedented growth in taxi services and personal vehicles in urban centers leading to traffic congestion, vehicular pollution and increased GHG emissions leading to degradation of natural environment, lack of road safety which is a major public health concern. Dispersed responsibilities with certain overlap across various agencies has also led to conflicts leaving the issues unresolved.

The critique of the existing policy by no way means to surmise that appropriate measures have not been taken by the government to address the challenges faced by the sector. Fiscal measures such as tax rebates on electric vehicles for promoting environment friendly transport or public awareness programs to improve road safety are all examples of policy

directives given by the policymakers after careful deliberations and consultations and implemented by execution agencies. However, there is an urgent need of a comprehensive policy document that lists out the intentions or objectives of the government. The document should be forward looking that anticipates the challenges the economy and the sector is expected to witness and therefore provides a consistent direction to the enforcement agencies working towards the common goal of efficient governance.

Since the existing policy has its limitations in providing such direction, the need for a new transport policy arises.

1.2. Approach & methodology to new transport policy formulation

United Nations Development Program (UNDP) has supported the initiative towards development of a ‘sustainable’ and ‘inclusive’ transport policy. International consultants, KPMG India along with a local consultant assisted the Ministry of Information and Communications (MoIC), the principal transport planning body of RGOB in formulating the policy. The work on this study started in Nov 2016 and is expected to conclude by July 2017.

To frame a balanced policy, it is imperative that due consideration is given to the impact it can create on all the areas that stand affected due to it. The transport sector has linkages not just with the society but also with other areas such as land, environment, climate, industries, tourism, economy, technology etc.

In order to develop a robust understanding of the core issues and challenges in transport sector, the consultants deep-dived into each transport sub-sector. An ‘as-is’ assessment of each sector was conducted as a first step. This report draws on the considerable work that has been carried out by various RGOB institutions in the past on the transport infrastructure sector. Existing literature in the form of transport specific reports carried out by various ministries, statistical handbooks published by RGOB, sector assessment studies undertaken by multi-laterals such as ADB and World Bank and various presentations prepared by concerned sector ministries highlighting sector issues, available in public domain have been referred. Wherever the data was old, limiting any meaningful analysis, request for latest information was placed to MoIC who facilitated in data collation from various departments and ministries under RGOB. Facts, figures or government opinion is duly referenced through footnotes in various parts of this report.

The participatory approach for policy making as recommended by GNHC was embedded in this study. Over 27 institutions were consulted through a series of one-to-one meetings, core group consultations and mission workshops. These included a balanced mix of interactions with ministries/ commissions/ autonomous bodies under RGOB, industry representative bodies and private sector associations. At all points of time, efforts were made that discussions were held with the officials at the decision making level to elicit the right response.

Two workshops have been conducted so far during the course of formulation of transport policy. The first workshop was a wider stakeholder event held on 23rd November 2016. The

workshop witnessed representation from 27 different institutions. To make the workshop interactive and gather the various viewpoints, the attendees were distributed in groups and the groups were asked to brainstorm about the specific themes of safety, environment and sustainability, inclusiveness and innovation and come up with suggestions about the ways of bringing in improvements with respect to the transport sector. This provided the consultants significant insights and ideas which have been referred to while developing policy statements.

The second workshop was conducted for a duration of 3 days between 06th and 08th February 2017. A core group consisting of 18 senior representatives from all relevant ministries of RGOB was formed for undertaking focused consultations³. The workshop was structured in sessions covering various elements of the policy document starting from policy objectives, guiding principles, governance structure to specific policy statements for each transport sub-sector - roads and road transport, urban transport, civil aviation and regional connectivity. Cross-cutting issues such as financing, environment, inclusiveness were also deliberated during the workshop. The intensive participation and insights by various experts have strengthened the policy document and ensured its relevance up to its planning horizon.

The minutes of each workshop have been duly recorded and submitted in the form of ‘Mission Reports’ to MoIC and UNDP for the record. A third and final workshop will be conducted in June 2017 to deliberate the revised drafts of the report and policy document which will again have participation from core stakeholder identified by UNDP and MoIC.

To develop a ground level understanding, field visits were also undertaken. Apart from Paro and Thimphu, visits to border crossing points of Phuentsholing and Samdrup Jongkhar were also undertaken to get the perspective on the state of physical infrastructure, regional trade and border dynamics.

Additionally, the consultants referred to various best practices globally both for specific policy measures adopted for various modes of transport and for understanding good governance structures. The learnings were contextualized with reference to Bhutan and have accordingly formed the basis of specific recommendations.

The efforts of the above exercise have converged into two documents - namely “Policy Protocol Report” and “National Transport Policy 2017”. The latter is the proposed policy document that is expected to replace the existing national transport policy 2006.

This Policy Protocol Report is devoted to setting the conditions for a coherent transport policy for Bhutan in the long term: the horizon is 2040, i.e. twenty two years from the beginning of the country’s 12th Five Year Plan. The report attempts to look at different transport sectors in an integrated manner and suggests mechanisms and measures for carrying this approach forward in a manner that reduces the resource costs involved. It also addresses a number of wider issues that affect all transport modes. Policy statements, thus formulated have been framed to resolve the issues and are aligned to both the targets of SDGs and the vision and strategies for transport adopted by RGOB. Apart from policy

³ Refer annexure for list of participants in the workshops

statements for each sector, the report also gives recommendations on strengthening of the institutional system for planning, management and execution of transport and identifies gaps in the existing legislations which need to be plugged to enable respective agencies to play their role effectively and in a transparent manner.

1.3. Structure of this report

The overall report has been divided into 9 chapters covering all transport sub-sectors - Roads and Road Transport, Urban Transport, Civil Aviation and Regional Connectivity. This chapter, i.e. Chapter 1 is the introductory chapter that presents a broader perspective on Bhutan, its geography, socio-economic environment and establishes the context in which the need for formulation of a new transport policy in the country arises. It also details the approach and methodology adopted for formulating the deliverables defined under the terms of reference to the consultants.

At the kick-off stage of the study, the consultant team was briefed about “Bhutan Transport 2040 Integrated Strategic Vision” document prepared in year 2011. The document outlines the vision and strategies of RGOB for the transport sector as a whole and for each sub-sector. It is understood that it has been developed based on extensive consultations spread over a one year period (2010-11) and has a buy in of all relevant stakeholders. It is therefore pertinent that this report brings out a brief synopsis of the goals and objectives for the transport which is articulated in Chapter 2. The policy document dovetails the vision and strategies as they have concurrence of RGOB.

The next four chapters i.e. Chapter 3 to 6 are on each sub-sector of transport namely Roads and Road Transport, Urban Transport, Civil Aviation and Regional Connectivity. The broad structure adopted in each chapter is to first carry out an “As-Is” assessment. This section outlines the current state of infrastructure and service delivery situation of each mode. For instance in the roads sector, it brings out facts on the extent of road network developed across all classes of roads, growth pattern of each road class, level of blacktopping, etc. The road transport analyses the penetration of country level public transport system, motorization trend, number of registered buses and taxis, status of their age, etc. Similar approach has been followed in developing a baseline of urban transport and civil aviation. In case of regional connectivity, the section addresses the state of “hard” infrastructure such as border roads, development of dry ports and supporting logistics infrastructure and “soft” infrastructure including customs and border procedures and level of automations of customs processes at key Land Customs Stations. Further to this, the scenario for each sub-sector by 2040 is envisioned. Projections on GHG emissions are developed based on motorization forecasts stated in the Integrated Vision 2040. Similar exercise has been undertaken for calculating emissions from growth in aviation traffic. In urban centres, urban road and supporting infrastructure requirements have been established. These forecasts helped in developing a perspective of the likely trends that will evolve in each mode of transport. The “As-Is” and future scenario analysis helped in forming an in-depth view of the challenges that each sector is presently facing or is likely to witness over the course of next two decades. To address the challenges, the interventions from a policy perspective that Bhutan should develop is subsequently established and presented in the last section under each chapter.

Subsequent to each sector analysis, the report undertakes an appraisal of the governance structure in Bhutan - institutions that play a role in policy and strategy formulation for each transport infrastructure, the execution, implementation and regulatory agencies. Various issues have been accordingly identified in the functional governance model and presented in Chapter 7 of this report.

Existing legislations governing transport are also reviewed with a perspective of understanding the shortcomings that are limiting various institutions in playing their respective role. Few international legislations, such as India's new Motor Vehicle Bill, have also been studied, learnings from which could be replicated by Bhutan for strengthening governance. This forms Chapter 8 of the report.

Views of stakeholders gathered at each stage of consultation were kept in consideration while formulating recommendations for each sector or for improvement in governance structure as a whole. The final chapter i.e. Chapter 9 summarizes the sector specific and overall transport management recommendations for the benefit of the readers of this report. The policy document has been derived based on the recommendations of this report.

Chapter 2: Bhutan's Transport 2040 Integrated Strategic Vision – A Synopsis

2.1 Introduction

Bhutan is in the midst of a socio-economic transformation with the economy seeing high GDP growth primarily driven by hydro-electricity exports. Recognizing the fact that the state of affairs in Bhutan over the course of next few decades will be very different from the present and that transport system needs to respond to the changing needs and demands, RGOB prepared a document named "Bhutan Transport 2040 Integrated Strategic Vision".

Transport 2040 Integrated Strategic Vision establishes the building blocks to enable Bhutan to achieve its vision for Transport. It comprises of an overall goal, supporting objectives, and a series of integrated strategies to guide government policy and investment planning. The strategies for road network development, road transport, urban transport, civil aviation, regional connectivity and overall transport sector management are explicitly laid

and adopted by RGOB. A series of transport sector specific initiatives undertaken since then are a result of the guidance provided under this document.

The overall vision covers both, the implementation of transport infrastructure as well as the execution of institutional and management functions associated with the delivery of transport services. This vision reflects the changing socio-economic development of the country. RGOB acknowledges that an integrated strategic vision can only be realized if it leads to a sustainable transport system. Therefore, this requires an approach that involves moving people, goods, and information in ways that reduce the impact on the environment, develop the economy, and strengthen society. It should include using more energy-efficient transport modes, improving transport choices, using cleaner fuels and technologies, applying information technology, and adopting progressive urban and regional planning approaches to reduce or replace physical travel.

2.2 Overall Transport Vision & Goals

The overall transport vision and goals outlined in the document are reproduced below.

Vision:

“To provide the entire population with a safe, reliable, affordable, convenient, cost effective and environment-friendly transport system in support of strategies for socio-economic development.”

Goals:

- accessibility to activities and supplies needed by people and enterprises,
- efficient use of economic resources,
- environmental sustainability, and
- transport safety especially on roads.

2.3 Sector Goals & Strategies

The strategies developed for transport have been guided by the following principles:

- a) Transport user affordability
- b) Macro-management affordability
- c) Safe transport
- d) Inclusiveness
- e) Asset sustainability
- f) Good governance

g) Green solutions

Sector specific goals and strategies adopted by RGOB are as follows:

Road Network

The development of the road network will be based on one integrated strategy covering all roads (except urban roads) from national highways, through feeder roads, to farm roads and access roads.

Goal: To provide and maintain a sustainable and affordable network of roads of all classes to meet the needs of the country

Objective:

- Improved main road network to reduce travel time
- Driving comfort from Thimphu to Indian border within 3 hours or reach eastern region of country within a day
- Regular and affordable transport service through an all-weather road for all rural settlements
- Reduced incidents of crashes

Strategies:

The strategy for National Highways involves widening of existing Eastern Western Highway (EWH) to 2 lanes with alignment improvements, completion of southern EWH, construction of new alignments and tunnels/ viaducts on key routes, improvement of access routes between industrial developments and major border crossings, improvement of engineering and construction technology and establish maintenance regime for all National Highways.

The rural road network strategy consists of creation of Dzongkhag Transport Master Plan (DTMP) for each Dzongkhag which prioritizes all transport investment based on inputs from communities and local administration, progressive upgradation of all dzongkhag roads to all weather roads based on traffic demand as well as establishment of a program for routine and periodic maintenance activities. Farm road strategy aims to provide sustainable and equitable access in rural areas, including remote communities. The strategy involves

- Rationalization and prioritization of the network based on locally prepared DTMPs
- Establishment of criteria for farm road construction
- Review construction standards and methods to ensure sustainability
- Construction of motorable bridges to ensure all weather accessibility.

Passenger Transport

Goal: To provide public passenger services for all which are safe, affordable and responsive to demand

Objectives:

- Provide affordable and safe public transport services to all Dzongkhag centres
- Provide passenger public services to all sizeable rural communities
- Provide consumer a fair choice between alternatives modes of transport
- Provide subsidies on non-profitable bus routes

Strategies:

The passenger transport strategy aims to provide safe and affordable inter-dzongkhag public transport services to all significant population centers based on demand. Government would provide an enabling environment within which the private sector can provide safe and effective services based on demand. This it states would be provided by measures such as determining schedules/ frequencies for inter-city bus services, regulating fares for buses and taxis, specifying appropriate type of vehicles that should ply on routes, regulating load for both passenger and freight. To promote rural connectivity, it states that shared taxis or mini-bus services would be encouraged and local routes will be formulated. It also recognizes the importance of terminal infrastructure for buses & taxis which would be developed in conjunction with the local community.

Freight Transport

Goal: The freight transport strategy aims to provide cost-effective and seamless freight services in response to demand.

Objectives:

- Develop modern efficient trucking system with green technologies
- Reliable and safe freight transport services whilst minimizing delivery time and cost
- Affordable freight rates ensuring competitiveness of Bhutan industries
- Development of logistic industry along with freight transport strategy

Strategies:

Given that operations in freight transport is predominantly through private sector, the strategies for modernization of this sector also depends on their actions. However, certain actions are required by the public sector. The document states that the government should:

- Introduce tax incentives for new large trucks that are fuel efficient and comply with stringent emission standards;
- Continue its efforts to improve the quality of the road network, and to build inter-modal transport facilities including warehouses, cold storage, and inland container depots and dry ports;

- Support the establishment of management information system and global positioning system tracking;
- Assist with the development of the logistics industry; and
- Investigate the potential for connections to the Indian rail network and the use of ropeways (aerial lifts) for specific commodity movements.

Regional Transport Connectivity

Goal: Facilitate trade and vehicle movement between Bhutan and other countries in the region through measures to improve transit and customs procedures, together with parallel strategies to improve international road, rail, and air transport links.

Objective:

- Reduce transport costs and travel times between Bhutan and other countries in the region through improved infrastructure
- Easier transit and customs procedures
- Development of beneficial and implementable transport and transit agreements.

Strategies:

The main strategies to achieve the above objectives include the continuing development of trade, transport, and transit agreements with neighboring countries; enhanced access to better road network and exploring rail connections; and improved facilities such as dry ports and improved customs at border crossings.

Civil Aviation

Goal: Maintain a competitive civil aviation environment and ensure safety, reliability and efficiency of air services to international standards.

Objective:

- Develop domestic civil aviation infrastructure and services
- Support tourism and increase cargo services
- Promote private sector participation to provide airport infrastructure and air transport services
- Provide permanent search and rescue and emergency services in all areas of Bhutan

Strategies:

The document outlines seven strategies for aviation sector:

- expansion of international links with other Asian hubs and regional centers;
- provision of air carrier services and airport facilities sufficient for growth targets;
- availability of domestic scheduled services linking main population centers;
- construction of airstrips in remote areas for short take-off and landing and helicopter services;

- provision of helicopter services for search and rescue, emergencies, and charter services;
- private sector participation in services and facilities; and
- effective regulation and compliance with international safety and environmental standards.

Urban Transport

Goal: Create an environmentally friendly and equitable urban transport system responding to the needs of the expanding population.

Objective:

The overall objective is to create vibrant, functional, and livable “green” cities, thus minimizing the adverse effects of traffic growth.

Strategies:

The document states that urban transport strategy should focus on providing attractive public transport services and facilities for pedestrians, so that walking becomes the dominant mode in the central area and for short trips. The strategy must also seek to control the impact of private cars through careful management of vehicle numbers and use.

Broadly, six key strategies have been identified under urban transport:

- review and updating of the existing structure plan based on the revised population and vehicle ownership forecasts, including the preparation of an urban transport plan;
- improvement of the traffic engineering and management system, including better use of existing road space, provision of safety enhancements, and revision of traffic circulation;
- development of public transport, including identifying measures to boost ridership based on several options, both for the short- and long term;
- improvement of facilities for pedestrians, including a safe and secure network of routes and priorities within the central area;
- consideration of controls or restrictions on vehicle ownership and use in urban areas; and
- conduct of a study on parking demand, establishment of a parking policy, and development of a package of regulatory measures.

Road Safety

Goal: Aims to improve road safety to a level achieved by countries with excellent road safety records.

Objectives:

- Reduce number of road deaths to under 5 per 10,000 vehicles by 2020
- Reduce rate of serious injuries by 50%
- Establish road safety culture with zero tolerance of unsafe driving behavior

Strategies:

The overall strategy will be implemented by:

- Establishing a road safety board,
- Developing a road safety action plan,
- Improving road design standards,
- Setting up a road safety audit process,
- Improving driver training and vehicle safety standards and testing,
- Strengthening the traffic police,
- Implementing an accident reporting and analysis system,
- Introducing school safety and public awareness programs,
- Undertaking a safety retrofit program, and
- Establishing a road safety fund.

Road Transport and Regulation

Goal: Establish a safe and environment friendly vehicle fleet, and adopt a high standard of driver training and behavior.

Objectives:

- Adopt international safety and emission standards
- Install systems and procedures for efficient control of vehicle registrations, vehicle roadworthiness and emission tests, driver licenses and public transport permits
- Provide efficient, modern equipment and procedures for testing and enforcing vehicle roadworthiness, weights and dimensions and emission regulations
- Comply with international driver education standards and practices
- Aggressive support for adoption of green technology alternatives
- Clear division of responsibilities for implementation and enforcement between the RSTA and Traffic Police Division

Strategies:

The Road Transport Regulation Strategy includes:

- improving the road code and drivers' training;
- establishing modern testing facilities for roadworthiness or privatize roadworthiness testing, emissions, and fuel standards;
- implementing enforcement programs for overloading, roadworthiness, and emissions;

- devolving enforcement of road rules to the traffic police, and the engineering aspects to the road agency;
- developing and implementing the Road Safety Action Plan;
- amending the Road Safety and Transport Act and regularly updating regulations;
- continuing the development of information and technology systems in RSTA and the traffic police;
- establishing a national traffic police and provide technical resources and training; and
- introducing incentives for fuel-efficient and green vehicles in coordination with the Ministry of Finance and the Ministry of Economic Affairs.

Transport Sector Management

The document recognizes that the sector specific strategies can be developed only if the overall transport sector has an effective management. To this end, it advocates the following goals and objectives.

Goal: To develop efficient and effective management of the transport sector to achieve the transport vision

Objectives:

- developing an institutional framework responsive to the changing transport sector requirements;
- developing technical capacity in the government and the private sector; and
- promoting the participation of the private sector in planning, engineering, construction, and maintenance services.

Strategies:

With regards to road development, it propagates that main road network should remain under DoR and the other roads (Dzongkhag roads, Thromde roads, Farm roads) should be under Local Governments. For all forms of roads, the technical standards should be formulated by DoR. The local governments should be involved in planning, implementation and maintenance of roads under their domain. It also recommends to contract all road maintenance to private sector over long run.

With regards to road transport, it cites issues in existing RST Act due to which responsibility overlaps/ conflicts have been observed. Road safety, traffic management and road signages are three areas where overlaps are observed between DoR & RSTA. Similarly, road safety and enforcement of regulations are overlapping between DoR & Traffic Police. It recommends amendment in the RST Act & Roads Act to clarify the responsibilities of various agencies.

With regards to overall transport strategy planning, it observes that there is no single agency responsible for national transport policy development and establishes the need to consolidate the same under a single ministry.

On road safety, the report stresses on the need for DoR to see road safety as an important part of its mandate. It recommends establishment of a Road Safety Board and Road Safety Co-ordination Unit comprising of technical staff from DoR, RSTA, Traffic Police and other relevant agencies.

Several options for the reorganization of existing transport agencies and the reallocation of management functions and responsibilities have been identified in Transport 2040 report. This includes:

Option 1: Continuing with existing organization structure but with better coordination by establishment of a Transport Board which would act as a virtual Minister of Transport and supported by Technical Coordination Unit. It notes that there was little support for this option within the government.

Option 2: Placing all the transport sector agencies and functions in a single ministry, which could be MoWHS. Under this option, it suggests creation of a Transport Planning & Coordination Unit reporting to the Secretary and responsible for plan and coordinate transport policy, feasibility studies and major implementation programmes. This option suggests retention of Civil Aviation under MoIC because it operates separately from the road and urban transport sub-sectors, and MoIC has the technical expertise in civil aviation policy and regulation.

Option 3: Creating a separate Ministry of Transport by reorganizing relevant agencies. The advantages noted in this option are that there will be a single mission and focal point for national transport development. Such ministry will be able facilitate coordination of transport activities and strengthen sector management. Except for creation of a new ministry under RGOB, it does not note any other disadvantage under this option.

Option 4: Explore other institutional models such as creation of state owned enterprises (SOEs) or statutory authorities. Statutory authorities, it notes, are commonly created to operate major infrastructure with some degree of freedom from government civil service rules, but with a well-defined mandate to meet public service requirements.

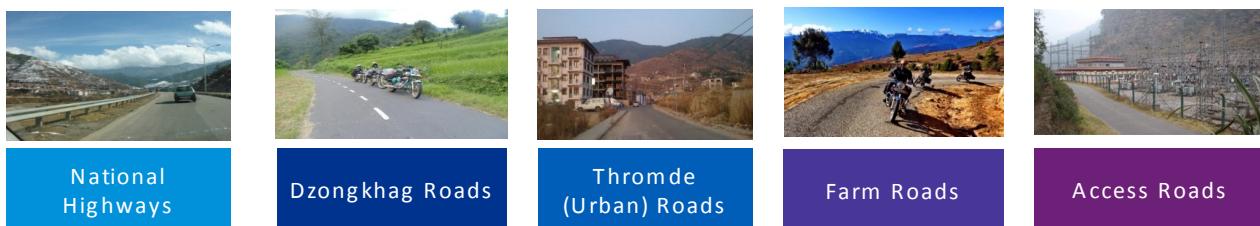
Amongst all alternatives explored, the report recommends the following:

- combine DOR and RSTA within a single ministry to ensure effective policy, planning and coordination in the road sub-sector as the most urgent requirement
- create a Ministry of Transport to be responsible for the entire transport sector within a year of above integration
- study the feasibility of devolving transport agencies into statutory authorities, SOEs and PPP concession agreements under the umbrella of the Ministry of Transport

Chapter 3: Roads and Road Transport

Being a land-locked country, an efficient road network and transport system in Bhutan assumes paramount importance as it plays a crucial role in supporting all development activities and in stimulating domestic and international trade. RGOB, ever since it began modern development process in 1961, has been consistently prioritizing road construction through five year plans. Major portion of country's overall financial outlay for development is allocated to road sector. MoWHS is the primary agency responsible for construction as well as maintenance of road assets mainly National Highways and Dzongkhag roads.

The roads in Bhutan are classified into five main categories namely National Highways, Dzongkhag Roads, Thromde (Urban) Roads, Farm Roads and Access Roads⁴.



*Figure 2: Types of roads in Bhutan
Source: Road sector master plan*

National highways are classified into

- **Asian Highway (AH)** - The design standards are specified by inter-governmental agreement on the Asian Highway Network.
- **Primary National Highway (PNH)** - Roads of strategic importance carrying high traffic volumes. As per the definition, it should be shortest possible route between two designated points and provide for width for two lanes.
- **Secondary National Highway (SNH)** - Roads that connect Dzongkhag center to a road of equal or higher classification as well as provide connectivity to two Dzongkhag centers.

Thromde Roads - are all roads located within the municipal boundary not otherwise designated as AH, PNH and SNH. The design standards are set by DES in consultation with DoR.

Dzongkhag Roads - connects Dzongkhag center to Gewog center or Dungkhag center or two Dungkhag centers or Dungkhag center to Gewog center or Gewog center to existing road of equal or higher classification. Planning, prioritization and budgeting of the Dzongkhag roads is done by respective Dzongkhag Tshogdu.

⁴ Review of Road Sector Master Plan (RSMP) 2007-2027

Farm Roads - Road links to farm land areas/ villages to an existing road of equal or higher classification to enable transportation of inputs to the farms and agriculture produce to the market. Planning, prioritization, budgeting and implementation of Farm Roads are done by the respective Gewogs with technical backstopping from Dzongkhag administration or Department of Agriculture.

Access Roads - These could be forest roads, health roads, education roads, telecommunications road, power tiller roads, private roads, project roads or public roads. Design standards are provided by DoR. The Access roads are generally built by beneficiaries following a minimum of farm road standard.

4.1. “As-Is” Assessment

Roads

RGOB has embarked a journey for road building programme where the basis of road development is on the principles of social justice and equality. Indeed a joint study undertaken by Asian Institute of Transport Development and UNESCAP reiterates the fact that there is a strong co-relation between accessibility and incidence of poverty. The study brings forth a perspective of transport as an entitlement and concludes that the benefit of road access to remote corners of the country is likely to generate significant benefits, which may have measurement problems, but have a contribution towards poverty reduction.

The present road building programme in Bhutan is steer-headed by MoWHS and is based on a document ‘Road Sector Master Plan (2007-2027)’ which was prepared in the year 2006 with an intent to carry out a planned development across the country. The master plan is 20 year programme that focuses on strategic road connectivity like the construction of South East-West Highway (SEWH), network expansion, road realignment, inter-dzongkhag connectivity, connectivity to potential economic growth centers and tunneling.

As of June 2016, Bhutan has developed a road network of length 11,176 km. National Highways comprised of around 2,560 km length, Dzongkhag roads of 1,504 km length and Farm roads including power tiller tracks of length 5,351 km. Access roads and urban roads network comprised of 1,359 km and 403 km length⁵ respectively. Farm roads constitute almost 48% of total network length whereas National Highways constitute approximately 23% of total road network in Bhutan.

- Road Network Growth

The road network has more than doubled in last 8 years ending 2016. It grew by an average of 2.4 km/ day of road network construction in this period. Since the focus during the

⁵ Annual Statistical Yearbook 2016, NASB, RGOB

decade (2007-2016) was towards construction of Farm, Urban and Dzongkhag roads, these roads have increased by 3.5 times, 1.5 times and 0.8 times respectively.

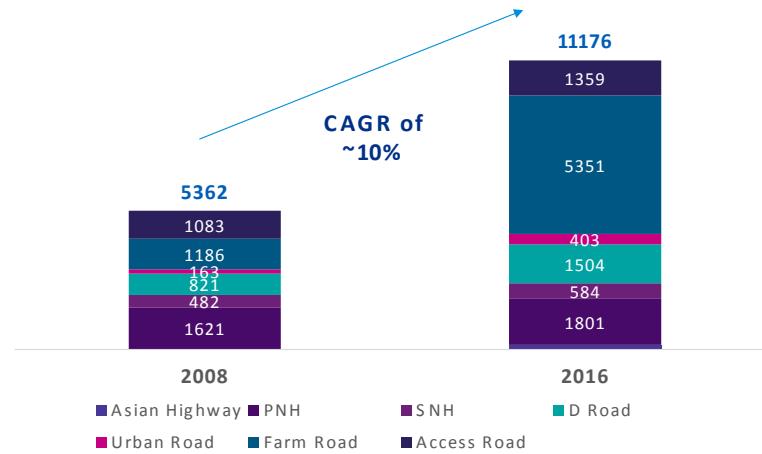


Figure 3: Road network growth in Bhutan (in Km)
Source: Review of road sector master plan 2007-2027

The road network presently serves a population density of about 18 persons per sq km which is far less than other countries in the region (988 in Bangladesh, 377 in India and 180 in Nepal).⁶ This explains that even though the population density is low across Bhutan, there is still a need for more roads in order to give access to the population residing in remote corners of the country. It may be noted that though urban roads account for only 4% of total road network, they support 40% of the total population.

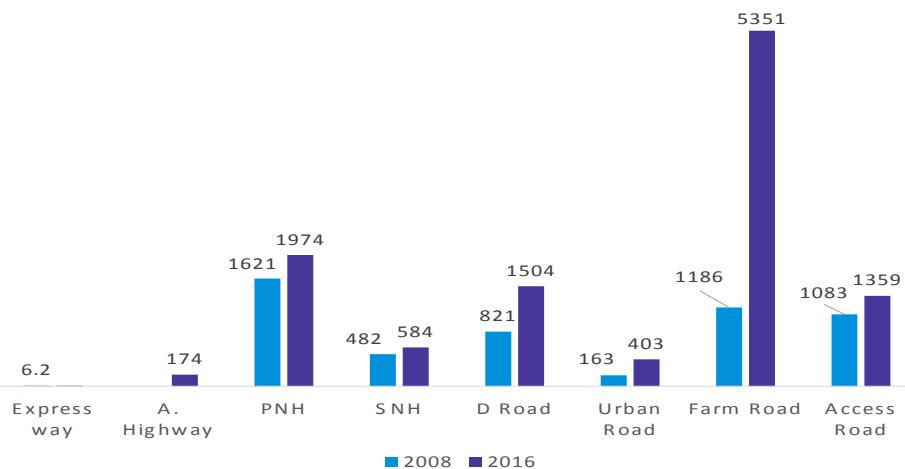


Figure 4: Growth in network size for different types of road since 2008
Source: Review of Road Sector Master Plan 2007-2027

⁶ Eleventh Five Year Plan 2013-18, Volume I, GNHC - 2013

- Quality of road network

Bhutan has achieved motorable road connectivity in 201 out of 205 Gewogs. The remaining 4 Gewogs are not connected on account of challenging terrain and climate. Further, the National Highway network connects all the 20 Dzongkhags.

Presently, only 30% of road network in Bhutan is blacktopped or sealed. The proportion of blacktopped network to total network has remained almost constant since the past five years. Blacktopping of road has progressed a meagre pace of 0.23 km per day during this period. This may be because of prioritization of developing farm roads over blacktopping of existing road network, given the limited financial resources.

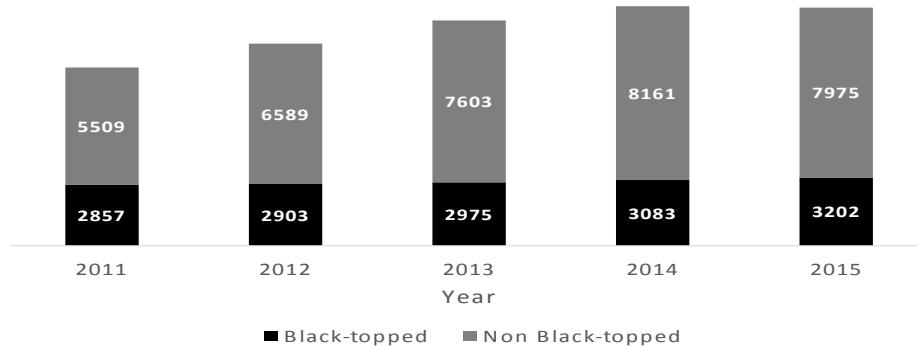


Figure 5: Blacktopped road network growth in Bhutan in last five years

Source: National Statistics Yearbook 2016, National Budget FY 2016-17

- Primary National Highways of Bhutan

The national highways form the backbone of the country's road network, comprising of (i) an operational network of Northern East-West Highway (NEWH), which passes through the center of the country linking the capital, Thimphu with central and eastern region; (ii) a series of north south corridors to the border with India, including the main access highway between Thimphu and Phuentsholing; and (iii) Southern East-West Highway which runs along border with India in the South, which has been only partially completed.

Name	Section	Total Length (Km)*	Maintenance Agency
PNH-1	Semtokha - Trashigang	512	DoR
AH-48	Thimphu - P/ling	170	DANTAK
PNH-3	Trongsa - Gelephu	180	DoR
PNH-4	Trashigang - S/Jongkhar	240	DANTAK
PNH-5	Gelephu - Wangdue	188	DoR

Table 1: Snapshot of Primary National Highway Network

Source: Department of Roads, MoWHS

*Note: The list of PNH in the table above is not exhaustive and only covers the major national highways

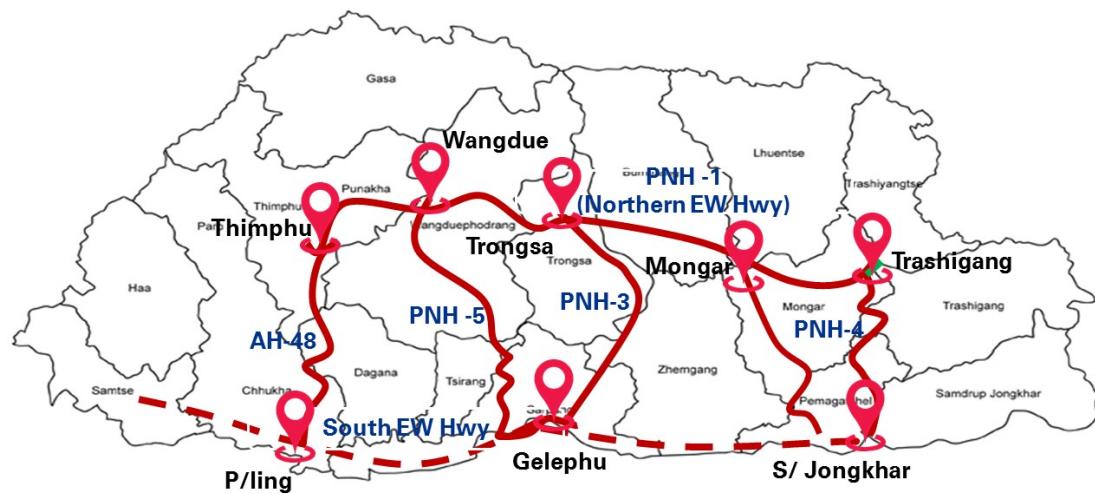


Figure 6: Primary Highway Network and Proposed South East -West Highway in Bhutan
Source: Data collection survey on Road connectivity in Bhutan, JICA, 2013

PNH - 1: Semtokha to Trashigang

The PNH 1 is currently the only road that crosses from east to west with five sections of this road at an altitude of more than 3000 m. The road witnesses blockage particularly in extreme winter and rainy season. Handling the highest traffic volumes, this road is vital as it connects principal urban centres to the south bound national highways. The highway also caters to nationally important hydro-power projects Punatshangchhu I and II and Magdechhu in Wangdue and Trongsa. The equipment and materials imported mainly from India are carried to the construction site through PNH-1 via Thimphu. Given the strategic importance of this highway, the RGOB has prioritized two-laning of road which is expected to be completed by December 2017.

Asian Highway-48: Thimphu to Phuentsholing

This national highway gives access from the western region of Bhutan to India via its state of West Bengal and is classified as an Asian Highway. Given the importance of this road, the government is developing by-passes at Samtse and Damchu to avoid land slide prone area and also shorten the distance. Most of its section comply with the guideline for National Highway and the road is relatively in satisfactory condition⁷.

PNH-3: Trashigang to Samdrup Jongkhar

This road runs from Trashigang in the east to Samdrup Jongkhar in the south, a town which shares its borders with Assam state of India. Cargo movement from Assam in India to east Bhutan typically happens through this road. The PNH is also used for the transportation of construction equipment and materials for hydro power plant being constructed at Kholongchhu at Trashi Yangtse; however to a limited extent on account of insufficient road width. Road maintenance work is under the control of DANTAK. Currently, road widening

⁷ Data Collection Survey on Road Connectivity in the Kingdom of Bhutan, JICA, 2014

work is underway. Road widening once completed is expected to increase cargo as well as passenger movement through this route.

PNH-4: Trongsa to Gelephu

This highway is important as it directly connects Magdechhu Hydro-electric Power plant to Gelephu, a town sharing its border with the state of Assam in India. The town already has a domestic airport. The planned south east-west highway (SEWH) is expected to further augment connectivity of Gelephu to eastern as well as western border towns. The SEWH connectivity also envisages developing Gelephu as an important border crossing point after Phuentsholing with planned transport hub, industrial estate, dry port, duty free zone, transport repair and servicing center as well as container center⁸.

PNH-5: Wangdue-Sarpang-Gelephu

This highway connects Sarpang, another border town to Wangdue. Presently, this highway is used to access ongoing construction site of Punatsangchhu I and II hydro power project. The road has many damaged sections on account of movement of heavy machinery to hydro power project site.

New North-South links

Further, construction of two new north south road links connecting Nganglam and Panbang in south to Mongar and PNH-4 respectively is expected to further improve connectivity of southern east region with northern regions of Bhutan and reduce travel time.

▪ Traffic volume on Primary National Highways

Presently, PNH-1, AH-48 and PNH 3 handle the maximum number of vehicles as they connect the most important border crossing points with main consumption centers in Bhutan. Highest traffic volume has been witnessed on North East West Highway; a section between Thimphu and Wangdue which is close to 1500+ vpd⁹. This is mainly on account of traffic being catered to East, South as well as project traffic to Punatsangchhu hydro energy plant. Second highest traffic volume is handled by Thimphu - Phuentsholing Asian Highway with daily volumes as high at 1000+ vpd. The traffic density is high as this critical link connects the busiest border crossing point to Bhutan's capital center. The traffic at other north south links have been increasing on account of recent construction as well as industrialization, albeit at a slow rate. However, the road link is expected to act as catalyst for regional development in future and contribute to national economic growth.

⁸ The Gelephu Structure Plan, Christopher Charles Benninger Architects, www.ebuild.in

⁹ vpd- vehicle per day

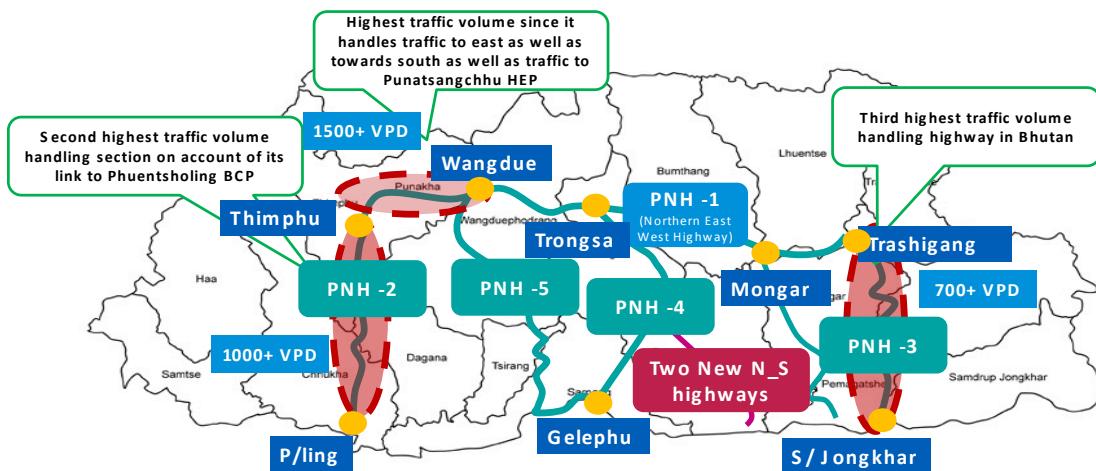


Figure 7: Critical PNH in Bhutan based on traffic volumes handled

Source: Bhutan Transport 2040 Integrated Strategic Vision, Strategies Report, December 2011

The PNH 3 connecting Samdrup Jongkhar with Trashigang as well as North East West Highway has third highest traffic volumes with 700+ vpd. The PNH 4 has traffic volume of 430+ vpd whereas PNH 5 has traffic of 450+ vpd.¹⁰

■ Funding for Road network

The Eleventh Five Year plan (2013-18) allocated Nu 15,996 Million towards road sector. Out of which 85% has been allocated towards construction and improvement of roads and 15% for road asset management. For FY 2015-16, the RGOB has allocated Nu 5,717 million to the road sector, accounting for 11% of its total budget of Nu 50,713 million. Even in FY 2016-17, the allocation has been similar i.e. Nu 5,818 million towards double laning of North East West Highway, maintaining national highway, dzongkhag roads, Gewog connectivity roads and bridges across the country¹¹.

Road Transport

Passenger transport

Passenger transport is dominated by privately run inter-dzongkhag bus & taxi services, comprising more than 50% of all trips¹², the remaining consists of share of private vehicles and hitch-hiking. As per RSTA data, a total of 356 buses are registered across Bhutan which ply for commercial purposes. 41% of such buses are registered in Thimphu region while another 46% are registered in Phuentsholing while balance 13% are registered in other areas. It may be noted that the available data is for the registered vehicles only. There might be cases where either vehicles are not registered and still plying on roads or are registered but not in operations. Presently, all 20 Dzongkhags are connected through intercity bus transport¹³. The average age of private commercial buses is 6.3 years.

¹⁰ Data collection survey on road connectivity, JICA, 2014

¹¹ National Budget, Financial Year 2016-17, Ministry of Finance, June 2016

¹² Bhutan 2040 Vision Document

¹³ www.rsta.gov.bt

Area-wise registration of inter-city buses

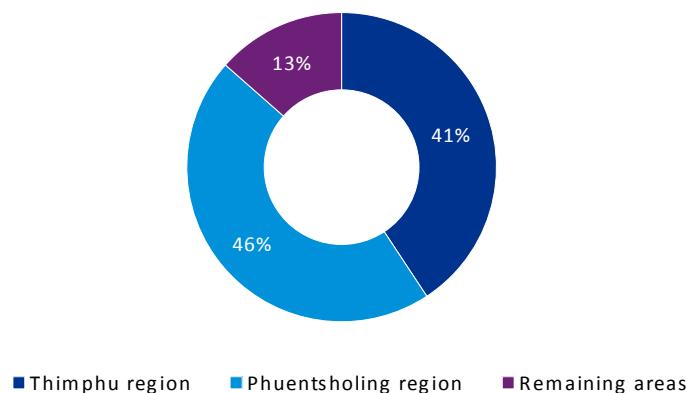


Figure 8: Area-wise registration of inter-dzongkhag buses

Source: RSTA

RSTA is responsible for creating an enabling environment to promote regional connectivity and to regulate inter-dzongkhag and rural transport. The market is liberalized and ‘free entry’ regime exists, whereby prospective private operators who meet the minimum requirements are able to apply for licenses and operate in the market. Bus Operators can compete on any bus route but RSTA controls departure times and requires that buses from different operators start with a minimum time intervals. There is strong competition among operators, especially for the busier and more profitable route. Bus operators are exempted of duties on the imported buses and get also tax exemption benefits. The total concession comprises exemption of BST of 15% and exemption from route permit fees.

Bus transport services operating throughout the country had carried over a million passengers during the year 2014-15¹⁴. The transport system in Bhutan has been divided into three groups to ensure comprehensive coverage. The three groups are Western, Southern & Central and Eastern Region.



Western Bhutan consists of Thimphu, Punakha, Wangdue, Haa and Paro. The western region has one bus terminal located at Thimphu and four base offices. Gasa, the northern most Dzongkhag, though connected by a bus service has no services originating. This is on account of extremely difficult terrain, extreme climate as well as sparse population. However, in line with Government’s philosophy to connect all dzongkhags with bus

¹⁴ Annual Report, Financial Year 2014-15, 7th Series

service, connectivity is established with Gasa with RGOB subsidizing the operating cost of the operator.¹⁵ The terminal at Thimphu provides an interchange for people travelling from North Eastern regions to South and West of Bhutan and vice-versa.

South and Central regions of Bhutan are merged into one region consisting of two bus terminals at Gelephu and Phuentsholing each and seven bases at Samtse, Tshirang, Dagana, Trongsa, Bumthang, Zhemgang and Tshimasham. The border towns of Gelephu and Phuentsholing are further supplemented by bus services to Indian towns and provide interchange station for people travelling onward to India i.e. mainly Jalpaiguri and Kolkata.



The Eastern region comprises of Samdrup Jongkhar, Trashigang, Mongar, Lhuentse, Trashiyangtse and Pemagatshel dzongkhag. The region is served by one terminal at Samdrup Jongkhar and five bases at abovementioned locations. The S/Jongkhar terminal also acts as an interchange point for people travelling to India, mainly Assam.

The map below analyses the route network of bus services across Bhutan. The thickness of the line demonstrates the higher levels of service between the origin and destination. As observed, the western and central part accounts for a relatively higher network for bus services. Over 75% of the bus services originate from 5 locations - Thimphu, Phuentsholing, Gelephu, Samtse & Tsirang. Nearly 2/3rd of the overall population resides in the western and central parts of Bhutan. While a higher number of operators operate on various origin destination(OD) combinations in the western part, with Thimphu to P/Ling route having as many as six (6) operators, in the eastern part, a particular OD combination is typically serviced by one (1) or two (2) operators.

¹⁵ Primary consultations with RSTA

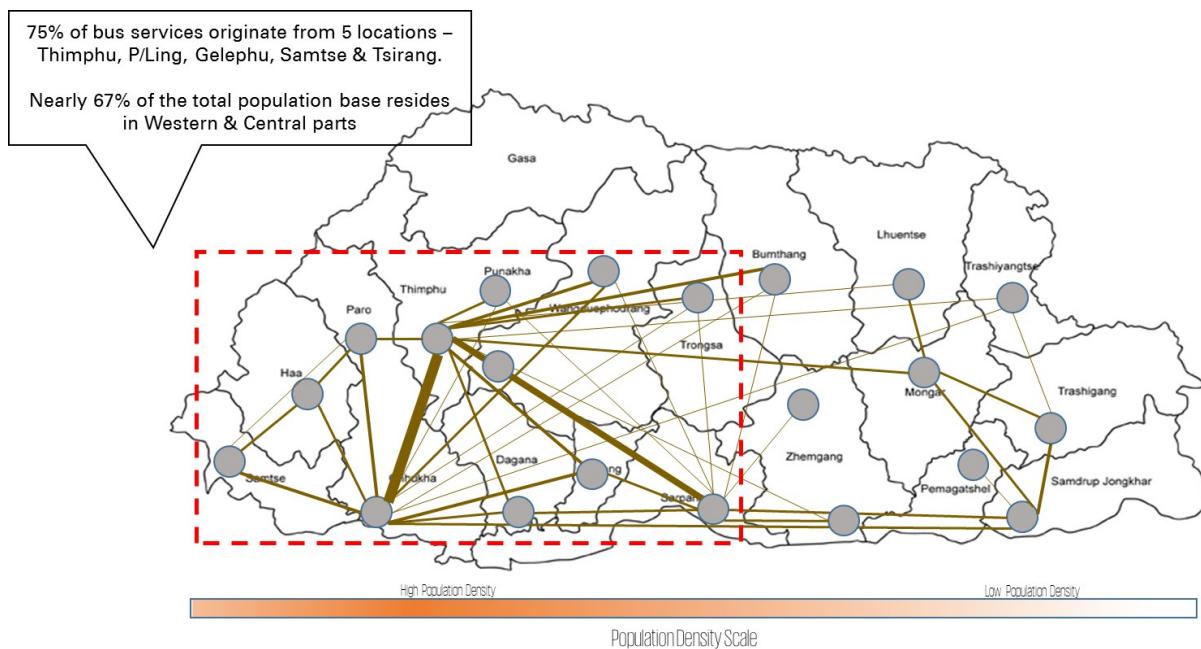


Figure 9: Bus route network at major Origin Destination (OD) combinations

Source: RSTA, KPMG Analysis

Note: The above shown route network does not depict exhaustive set of OD combinations

Since July 2010, a form of a subsidy has been implemented by Government on unprofitable routes. RSTA provides financial assistance to bus operators on such routes through Government paying the interest on bank loans for the acquisition of buses plying these routes.

With regards to taxi services, presently a total of approximately 4,800 taxis are registered in Bhutan. Nearly 66% of them are registered in Thimphu region while another 24% are registered in Phuentsholing region. As per the existing rules, vehicles registered in a particular region can travel anywhere across Bhutan. Therefore it is difficult to segregate the extent to which these taxis are used within city and the percentage which are plying on inter-dzongkhag routes. The average age of these taxis is about 6 years.

Number of registered taxis & their average age

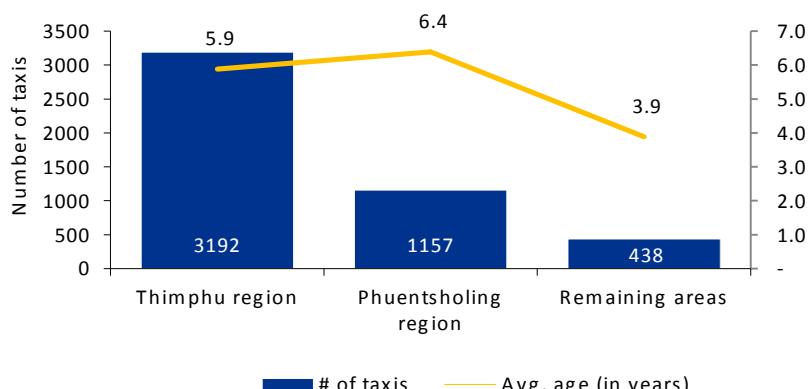


Figure 10: Present number of region-wise registered taxis with their average age in years
Source: RSTA, KPMG Analysis

As of 2015, the western and southern region of Bhutan contribute 71% of total number of passengers travelling by passenger transport service in Bhutan¹⁶. The Surface Transport Master Plan conducted a survey in 2006 to establish the modal choice of intercity passenger trips. The survey was carried out on a sample basis at major check posts in the country. The results were reported as below:

Mode of Travel	Average daily passenger trips	% Share
Car	4,330	42.9
Taxi	2,864	28.3
Bus	2,572	25.5
2 Wheeler	337	3.3

Table 2: Modal Split of Intercity Trips
Source: Surface Transport Study, 2007

There is no recent data available on modal share. The passenger bus service has registered growth in passenger numbers year on year on account of commencement of new services connecting newer locations as well as increased frequencies of existing service. However, on account of the rapid growth in personal vehicle ownership, it would be safe to conclude that the share of public transport is bound to have come down when compared to private modes.

Freight transport

Freight activity is typically required either for industrial purposes or for facilitating the consumption markets. With regards to the industrial activity in Bhutan, it is predominantly concentrated in Southern part bordering with India at the towns of Pasakha, Samtse and Nganglam. More industrial estates and special economic zones are also planned in Sarpang, Samtse, Samdrup Jongkhar and Mongar¹⁷. The map below highlights the location of the existing and planned industrial centres.

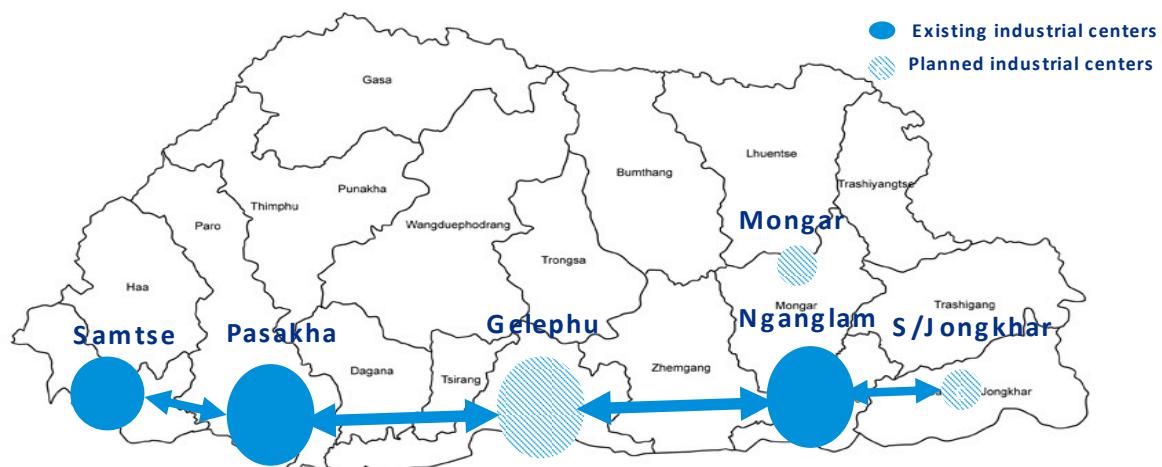


Figure 11: Existing as well as planned industrial centers in Bhutan

¹⁶ Annual Report for Financial Year, 2014-15, RSTA

¹⁷ Eleventh five year plan, 2013-18, RGOB

Source: *Diagnostic Trade Integration Study, 2011, MoEA*

Absence of rail network means that the country is completely dependent on road. Air freight is minuscule and caters to only high value products. The road freight traffic in Bhutan consists of mainly four categories (i) mining, metal and metal based products moved as bulk cargo, (ii) petroleum moved in oil tankers, (iii) agriculture and horticulture products moved as general cargo in open trucks or rarely in dedicated refrigerated containers and (iv) manufactured products moved in-country as general cargo in open trucks or containerized when coming from a third country. The contribution of the transport, storage and communication sector to GDP grew from 6.2 per cent in 1990 to 9 per cent in 2015¹⁸. The employment opportunities in this sector have also increased in the past years. The number of persons employed in transport, storage and communication sector in 2015 was 12,063 contributing 3.8% of total employment in Bhutan.

The transport and logistics sector is liberalized and has very little regulations. Companies planning to engage in these activities have to register for a service license and drivers have to obtain a truck driving license. The freight rates in Bhutan are higher than the region. Government agencies pay fixed price of Nu 6.5 per tonne per km for heavy vehicles. Freight costs of road transport of 10 tonnes from Phuentsholing to Thimphu are approximate Nu 15,000 - 18,000. The freight costs for a TEU container from Kolkata to Phuentsholing are Nu 30,000-35,000¹⁹.

As per diagnostic trade integration study undertaken by Ministry of Economic Affairs, there are several factors leading to high costs. The major ones are (a) the transport sector has relatively high fixed costs, with fuel making upto 50 per cent of the operating costs; (b) staff costs are high due to shortage of drivers; (c) absence of critical road network in southern part leading to longer travel times (d) land prices for warehouses, workshops, parking and storage places are also high; (e) cargo volumes are low and unbalanced and (f) the low level of containerization is also one of the factors leading to increase in handling costs.

Road Safety

With increased motorization, there has been a high concentration of vehicles in Bhutan especially in western region i.e. Thimphu and Phuentsholing. Motor vehicle registration increased from 22,504 in 2001 to 83,003²⁰ by October 2016. With increased traffic volume, road safety has become a growing challenge.

As can be seen in the chart below, an average of 1,000 road crashes occur in Bhutan every year. Almost 50% of the crashes result in some injury. While the country is witnessing an overall declining trend in road crashes and resulting injuries, the death statistics reflect a fluctuating trend. Between 2010 and 2015, an average of almost 85 persons died every year due to road crashes. The statistics for this five year block is higher than the previous five year period. The road fatalities stand at around 13 per 10,000 vehicles, one of highest in

¹⁸ Statistical Yearbook of Bhutan, National Statistics Bureau, 2016

¹⁹ Diagnostic Trade Integration Study, Ministry of Economic Affairs

²⁰ ADB 2015, basic statistics, RSTA website

South Asia. In Europe, North America or Australia, these numbers typically hover at around 2 fatalities per year per 10,000 vehicles²¹. RGOB intends to bring this down to 5 per 10,000 vehicles by 2020. The road crash statistics are presented in the chart below.

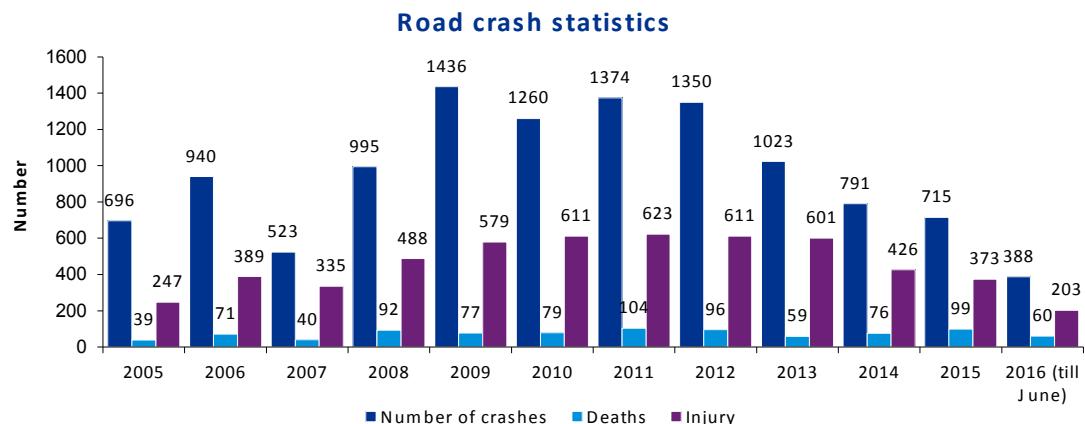


Figure 12: Road crash statistics in Bhutan
Source: Royal Bhutan Police

Fatalities/ 10,000 vehicles

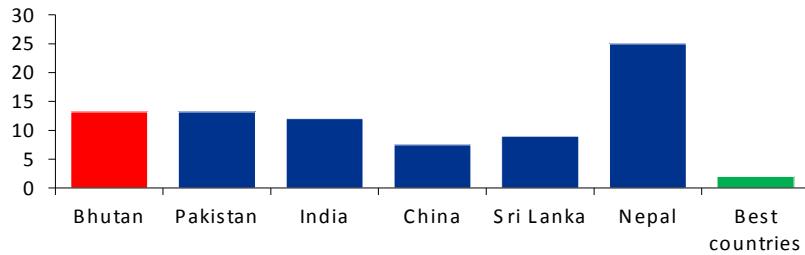


Figure 13: Fatalities/ 10,000 vehicles
Source: RSTA, World Bank & WHO

The main stakeholders involved in road safety are RSTA, Royal Bhutan Police, DoR under MoWHS, Local Governments including Thromdes. Their role with regards to road safety is provided in the table below.

²¹Bhutan Transport 2040 Integrated Strategic Vision, December 2011

Sr No	Agency	Role
1	Road safety and Transport Authority (RSTA), MoIC	Lead agency
2	Royal Bhutan Police (Traffic police)	Enforcement
3	Department of Roads (DoR), MoWHS	Responsible for planning, designing and construction of roads bridges and other infrastructure
4	Municipalities	Urban roads and Urban transport
5	Local government authorities	Block and district level road construction, parking etc

Table 3: Main stakeholders for road safety

Source: RSTA

RGOB has launched a Decade of Action on Road Safety (2011-2020) in May 2011 to comprehensively address road safety issues as well as reduce fatalities/ injuries due to road accidents. Some of measures undertaken include:

- Increased penalty amount for major offences and developing regulation on traffic disciplinary committee.
- Setup a Road Safety and Traffic Coordination Committee to co-ordinate with different stakeholders in identifying issues as well as joint resolution
- Conduct awareness programs consisting of focus group address, media ads and programs, social media outreach, launch of official website for information dissemination.
- Stricter enforcement consisting of zero tolerance to traffic violations, highway checks for speed, drunk driving; vehicle fitness and road worthiness etc.

4.2. Surface transport scenario by 2040

Bhutan in 2040 is expected to be significantly different from its current scenario. The intensity of economic development driven by energy production, growth in tourism, rural to urban migration of population is going to create a significant impact on the requirements for transport both infrastructure and services. This section presents a perspective on the roads and road transport scenario by 2040.

Road network

Bhutan vision 2040 document provides projections of growth in traffic over a 30 year period. The map below shows key stretches where intensity of traffic is expected to increase.

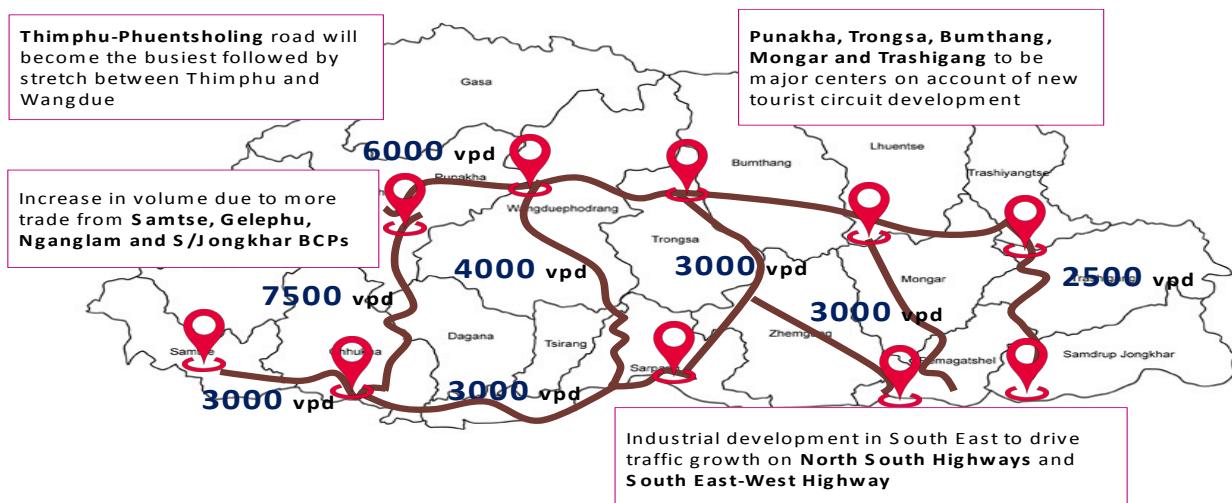


Figure 14: Traffic on Primary National Highways by 2040
Source: Bhutan 2040 - Integrated Strategic Vision, KPMG Analysis

The AH 48 between Thimphu and Phuentsholing is likely to become the busiest route with a vehicle per day (vpd) movement projected to reach upto 7,500. Presently, this route handles 1,000+ vpd. The Asian Highway is also a part of SASEC programme and already acts as an arterial transport corridor. This link is expected to handle highest volume of intra sub-regional and external trade and would have positive impact on trade expansion²².

This will be followed by the stretch on PNH-1 between Thimphu to Wangdue where the vehicle movement is expected to peak up to 6,000 per day from the present level of 1,500. The PNH 5 between Wangdue to Gelephu is also expected to generate heavy traffic and is projected to grow almost 9 times to reach up to 4,000 vpd from 450+ vpd handled presently. The stretches on SEWH as well as PNH 4 and PNH 3 are expected to be relatively less busy with per day vehicle movement ranging between 2,500 - 3,000.

To be able to handle these projected increase in traffic, significant road infrastructure enhancement needs to be carried out in the near future itself. MoWHS, the principal agency for road development, has set the following action plan for the next decade.

- **Construct and complete the South East-West highway as per PNH standard -** Completion of the SEWH is critical to provide east-west connectivity in the south, which otherwise involves a long journey via NEWH. Alternately, movement happens via India which exposes the commuters to uncertainties such as strikes and bandhs. Development of SEWH is also critical to enhance the economic and social development in the southeastern part of the Bhutan. Out of 794 kms of total road length, 506 kms is proposed as new construction and the remaining 288 kms involves upgradation of existing roads. As of December 2016, 141 kms of new construction and 39 kms of upgradation has been completed. While it was originally targeted to be completed by

²² South Asia Sub-regional Economic Co-operation Operational Plan 2016-2025

2017, the development is expected to take a longer time. However, the importance and urgency to develop this road network cannot be undermined.

- **Construct new roads to provide inter-dzongkhag connectivity** - A total of 537 kms of roads have been identified to be constructed/ upgraded to boost inter-dzongkhag connectivity. This construction is intended to reduce the distance of travel between neighboring dzongkhag and faster movement of people within region. Further, about 132 new feeder (dzongkhag) roads with a total length of 2,654 km has been prioritized, which would benefit a total of nearly 21,000 households excluding indirect beneficiary households. MoWHS, in collaboration with the MoAF and the Local Government, has successfully completed the construction of these feeder roads as of December 2016. Blacktopping of these roads is however required to undertaken at priority to provide all weather connectivity to Gewogs. At present, only 478 km of dzongkhag roads are blacktopped in a total of 2,654 km.
- **Road realignment** - Stretches which are either prone to landslide or are generally unsafe due to poor alignment needs improvement. Almost 62 kms of realignment has been identified which needs to be taken up on priority.
- **Tunneling** - Ten (10) road tunnels have been identified along the various parts of the road network in order to reduce travel distances. The DoR has completed the pre-feasibility study on three sites from ten potential sites for tunnel construction. The Gedu-Ganglakha section of AH-48 has been prioritized for tunneling on account of bypassing the landslide prone area of Jumbja on AH-48. The second site found to be most feasible is Thimphu-Wangdue section on PNH-1. Further there is a requirement of tunneling in Gayzamchu-Sengor section of PNH-1. This section is proposed to bypass Thrumshing La pass, located at highest altitude on PNH-1 and subjected to frequent road blocks on account of snow cover in winter.

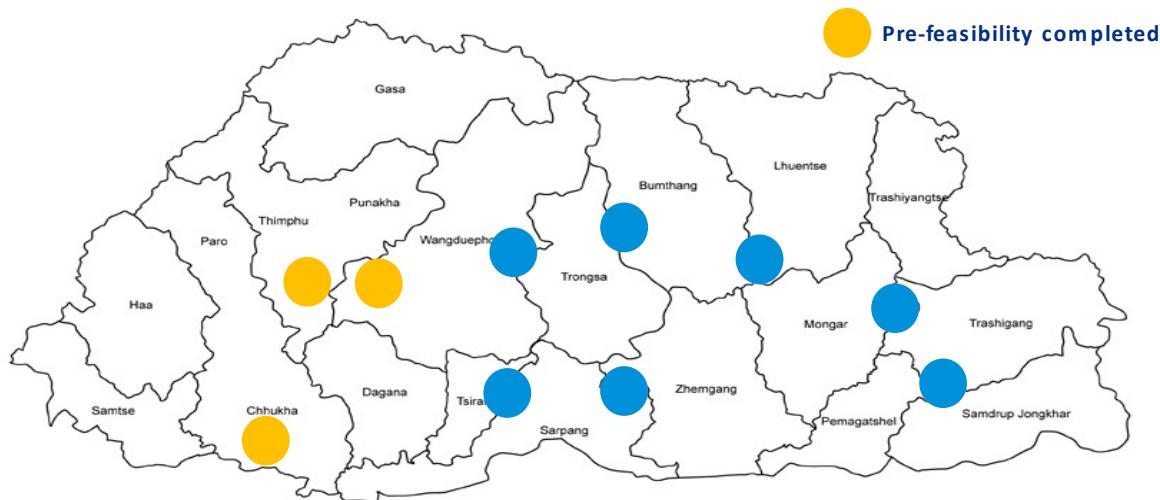


Figure 15: Location of proposed tunnels as per RSMP 2007-2027
Source: Kuenzel, April 22, 2014

The Ministry has prepared a phased action plan for the next 10 years with respect to road network construction as well improvement. The plan, which involves consolidating road network by upgrading capacity, improving connectivity through blacktopping, reducing distances through tunneling and improved road asset management, is summarized below.

Sr No	Road Network component	Upgradation (in Km)	New construction (in Km)
Action Plan 2017-2022			
1	South East-West Highway	123	144
2	Inter-Dzongkhag connectivity	35	32
3	Tunnel # 1	-	-
Action Plan 2022-2027			
1	South East-West Highway	156	50
2	Inter-Dzongkhag connectivity	288	197
3	Bypass to improve existing inter-Dzongkhag routes	-	NA
4	Tunnel # 2	-	-

Table 4: Road Action Plan 2017-2027

Source: DRAFT road sector master plan, Feb 2017

About 1025 km of road is expected to be constructed and upgraded by 2027. With development of this additional network, the total road network length across Bhutan shall be over 12,000 km by 2027.

Countries	Road Km/1000 population
Canada	44.92
Australia	42.88
Sweden	23.95
New Zealand	23.86
United States	22.22
Mongolia	19.86
Oman	14.15
Bhutan	12.5*
Luxembourg	11.85
Greece	10.75
Italy	8.43
South Africa	8.23
Nepal	0.554
India	3.32
Bangladesh	1.64

Table 5: Road density per 1000 population

Source: www.nationmaster.com

*Projected road density for Bhutan

Considering population of 960,000 projected till 2040, the per capita road network will be 12.5* km per 1000 people which seems to be quite adequate and hence post this construction work, the focus should be towards the following:

- Upgrading highway stretches based on traffic. This will be required for certain sections of PNH which are not currently double laned. Ex: Gelephu - Wangdue and Trongsa - Gelephu
- Provision of access road connectivity to power plants, health center, schools etc

- Identifying landslide and accident prone areas and construction of by-passes/tunnels
- Blacktopping network of National Highways and Dzongkhag roads
- Undertaking improvement on road designs with storm water drainage, river training, protection from slope failure etc.

Passenger transport

The passenger road transport is mainly dependent on bus services apart from personal vehicles. RGOB has already established bus connectivity to all Dzongkhag centers. All the services are predominantly run by private players with support of RSTA in form of subsidies on low passenger density routes.

Forecasts of inter-dzongkhag passenger transport are provided in Bhutan 2040 Integrated Strategic Vision. As per the document, it is estimated that the number of annual bus passenger trips could exceed 7 million by 2040. Much of this growth will result from increased travel between newly enlarged towns and additional trips by urban migrants returning to visit rural areas. In future, larger vehicles are expected to be introduced on the main trunk routes during the forecast period, following the widening and upgrading of the main road network, and in line with passenger demand. Thus, by 2040, it is expected to require around 300 larger buses and 600 small and medium sized buses.

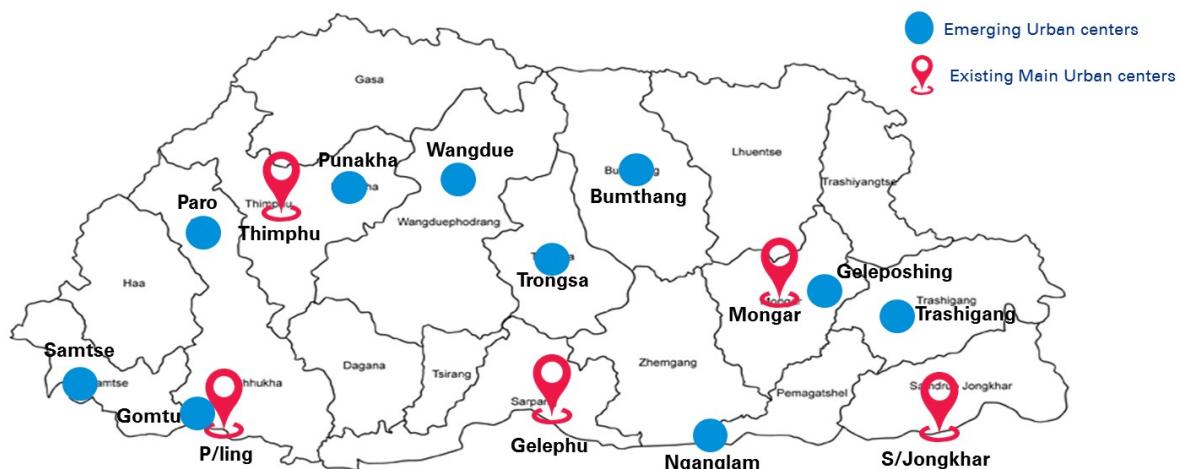


Figure 16: Urban centers in Bhutan by 2040
Source: Bhutan National Urbanization Strategy, KPMG Analysis

Bhutan is experiencing a significant demographic shift in terms of urbanization. Close to 70% of population is expected to be residing in above mentioned urban centers and hence would be higher demand for travel between urban centers, dzongkhag centers as well as Gewogs.

Another driver impacting passenger transport scenario is the extensive road network which is currently developed in the country. With each gewog connectivity established, there is a

need for a transport service to run over these roads and connect important centers of the country.

There would be requirement to strengthen inter-gewog connectivity as well gewog to dzongkhag center connectivity which are quite low at present yet critical in terms of linking rural communities to markets, providing them access to livelihood and critical services such as education, health, etc as well as broad basing economic growth amongst rural communities. This is integral to the GNHC philosophy of inclusive growth.

With connectivity and provision for transport service, critical passenger transport infrastructure development and augmentation consisting of development bus terminals and bus stops is required. All the dzongkhag centers will require a bus terminal as well as taxi stand by 2040. Similarly, each of the gewog which has road connectivity will require at least one bus shelter/waiting area per gewog i.e. 201 shelters.

GHG Emissions

Royal Government of Bhutan made a declaration at the 15th session of the Conference of Parties to the UNFCCC in Copenhagen, and reaffirmed in the Intended Nationally Determined Contributions (INDC) towards Paris Agreement 2015, that the national GHG emissions will be less than the sequestration capacity of the sink for all times. As per NEC, in the year 2000, total CO₂ emission was 1.56 million tons of CO₂ equivalent with a total CO₂ sequestration from forestry and land use amounting to 6.30 million tons of CO₂ equivalent. Transportation sector accounts for 45 per cent of all energy related emissions and 7.5 per cent of total national GHG emissions. Emissions from sectors such as industrial processes and transport are showing a rapidly increasing trend. During the period 2000-2013, emissions from the energy sector increased by 191.6% from 0.27 million tons of CO₂e in 2000 to 0.79 million tons of CO₂e in 2013. During the same period, emissions from industrial processes increased by 154.3% from 0.24 million tons of CO₂e to 0.6 million tons of CO₂e. With rapidly increasing ownership of passenger vehicles, the emissions from transportation sector are increasing significantly.

In order to expand the economy while remaining carbon neutral, it is imperative to reduce the GHG emission from transportation sector. Globally all major economies such as China and USA are promoting electric vehicle to: a) Reduce local pollution levels b) Improve energy security.

Global 4-wheeler EV stock grew by 70% and crossed 1 million mark in 2015. Since Bhutan produces most of its power from renewable sources, electric vehicles can help Bhutan significantly reduce the emissions from transportation sector and at the same time improve the energy security.

Currently the price of electric vehicles is higher than that of equivalent ICE vehicle. With rapidly declining cost of lithium ion batteries, it is expected that passenger electric vehicles will be cheaper than ICE vehicles by 2023.

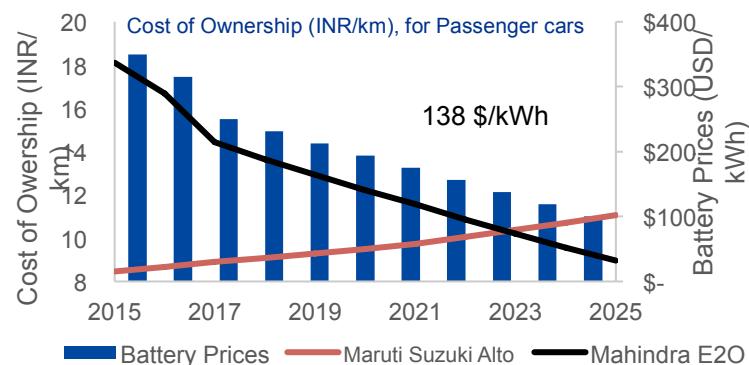


Figure 17: Cost of ownership forecasts for EV passenger cars
Source: KPMG Analysis

Forecasts have been made for estimating the impact of transport on CO₂ and other GHG emissions. The analysis is presented in a business as usual (BAU) case where it is assumed

that Bhutan takes no further measures to systematically reduce petrol or diesel fueled vehicles. The second scenario assumes a switch to EV technology and calculates the impact on reduction in GHG as a result of its adoption. The impact is also analyzed for switching to better fuel quality i.e. from Euro III to Euro IV and Euro VI.

CO2 emission forecasts

In a BAU scenario, CO2 emission from passenger vehicles and taxis is expected to increase to 0.53 million tonne CO2 by 2040 which is 4.5 times the CO2 emission from transportation sector in 2000. Bhutan has launched various initiatives to promote EVs. With adoption of EVs, CO2 emission can be reduced by 15.6 per cent (0.08 million tonne CO2) by 2040 as against the BAU scenario²³.

Other GHG emissions forecasts

If Bhutan shifts from Euro III fuel to Euro IV fuel, it will witness a decrease of GHG emissions by 44 per cent by 2040 against the BAU scenario. Adopting the Euro VI fuel can reduce the GHG emission further by 10 per cent to 54 per cent by 2040. EV adoption can also help Bhutan reduce its GHG emission by 16 per cent against the BAU scenario.

Change in power consumption

EVs would require around 95 MUs by 2040 which is around 5 per cent of Bhutan's current power demand.

²³ Refer annexure for forecasting methodology

4.3. Challenges in Roads & Road Transport

The key challenges in front of Bhutan in relation to the road sector can be summarized as follows.

- **Road assets: Preservation and management**

The current network of roads has crossed 11,000 km mark and additional 1,000 kms is expected to be added over the next decade. Being a landlocked country, road will continue to dominate and stay as a primary mode of transportation. As established earlier, the road network post the planned upgradation will be sufficient to cater to the projected demand. Certain sections of primary highway which are not yet double laned will require suitable expansions as and when the traffic demand increase. The challenge in front of Bhutan is the preservation and management of the developed network. Presently only 30% of the overall road network is black-topped. Challenging environmental conditions, including uneven mountainous terrain, a relatively longer monsoon season (June to September) triggering landslides, heavy snow from December to February, demand a whole gamut of asset management activities.

From a financial perspective, the DoR's routine maintenance for roads and bridges budget in FY 2015-16 was about Nu 286 million and the budgeted allocation for routine maintenance is Nu 1200 million in the 11th Five year plan. As per ADB's estimates, this allocation is adequate to maintain 72% of road network in fair or better condition which is considered acceptable and sustainable for long term road asset management²⁴. Sufficient funds need to stay allocated to the sector even in the 12th Five year plan.

- **Transport connectivity service enhancement**

From an infrastructure development perspective, RGOB had set itself a numerical target of providing road access to its population and has over the last decade worked towards achieving the goal. However, from a service delivery point of view, Bhutan continues to grapple with an environment where only a few bus operators exist on certain OD combinations thereby making the public service prone to disruptions. While inter-dzongkhag bus service connects all the dzongkhag centers and important urban centers, there are gaps in providing transport between gewogs. Many a times, private vehicles such as tempo, van, commercial jeeps, power tillers etc are used for passenger transportation.

To improve service delivery, government had also come up with a liberalization scheme that intended to enhance private sector participation whereby potential operators who meet minimum requirements are able to apply for licenses and operate in the market. While it did induce participation and competition from private sector on profitable routes, the unprofitable routes have not found many service providers. There is an urgent need for government to set overall targets of service delivery and then evolve various mechanism and risk sharing structures with private sector which leverage on the private partner

²⁴ South Asia Sub-regional Economic Cooperation Transport, Trade Facilitation and Logistics Project (Transport (Road Transport [Non-Urban])), RRP BHU 47284, Sector Assessment (Summary)

efficiencies. At places where private sector participation is not possible, alternate models of public sector facilitated by community participation can be explored.

- Inadequate bus transport infrastructure



Figure 18: Bus terminal in Bhutan

Source: <https://www.slideshare.net/shrdcinfo/urban-transportation-city-presentation-thimpubhutan>

The bus transport infrastructure is inadequate with insufficient bus terminals. The existing bus terminals are ill-equipped with respect to passenger waiting area, provision for public conveniences, electronic information boards and passenger information systems, parking, safety and surveillance systems etc. Also, there is a requirement of construction of bus stops with shelters at Gewogs as well as enroute for passengers to assemble, wait as well as protect them from adverse weather.

- Enhancing road safety

As observed from the statistics, road crashes in Bhutan have been declining however fatalities data show a fluctuating trend. While a part of it could be attributed to the increased motorization, it is also a result of the absence of coordinated policy to control the problem. In Nov 2014, a study on road safety had been undertaken through ADB assistance. The study reviewed the safety situation in Bhutan and identified the following issues:

- a) Institutional challenges of road safety leadership, management, capacity and coordination at all levels: policy, planning and implementation;
- b) Absence of clear, well defined road safety policies, strategies and action plans;
- c) Need for focused results and targets with intermediate and final outcomes for identified challenges.

The study further mentions that the accident data systems are inadequate. Social cost of accidents are not used as a basis for funding. Updated legal framework is lacking. In general, road design standards and rules governing the safety of much of the urban and rural network have not kept pace with international good practice in road safety engineering. Vehicle standards and roadworthiness inspections system is poor. There is no systematic planned structure for school education.

- Growth in vehicle related emissions

According to a recent report²⁵ by NEC, one of the major factors contributing to the declining air quality in Bhutan has been the growth of motor vehicles. This directly contributes to increase in tailpipe emissions, however there are other related emissions including particulate matter from tyre and brake wear-out and re-suspended road dust. The figures below depicts the increase in particulate matter (PM) in Thimphu in the last 7 years. It can be observed that the annual average PM10 level is well above the WHO guidelines and even crossing EU defined limits.

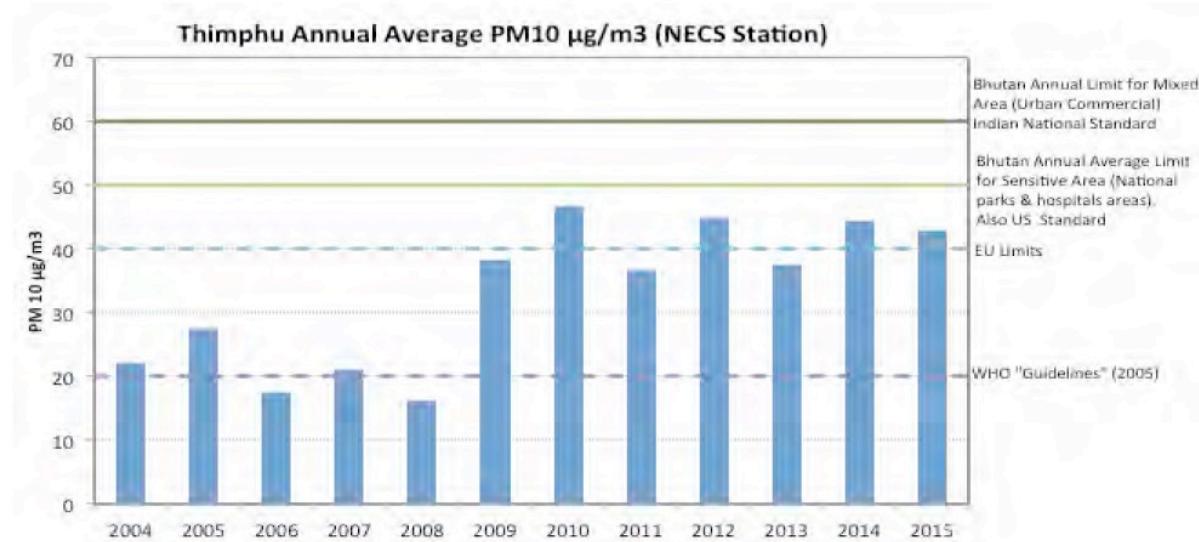


Figure 19: Annual Average PM10 level data for Thimphu
Source: Bhutan State of the Environment Report 2016, NEC website

Forecasts indicate that CO₂ emission from passenger vehicles and taxis is expected to increase to 0.53 million tonne CO₂ by 2040 i.e. 4.5 times the CO₂ emission from transportation sector in 2000.

The main issue in emission from transport is on two fronts - a) standards for vehicle emission & fuel efficiency, both for new as well as in-use vehicles and b) quality of fuel imported. The vehicle emission standards currently in place were set in 2004 and revised in 2007. With regards to fuel quality, Bhutan imports unleaded petrol and low-sulphur diesel adhering to Euro III standards.

Another aspect is the effectiveness of the vehicle inspection and maintenance program. As per RSTA's mandate, it is responsible for inspection of vehicles entering border crossing points as well as within Bhutan. The inspection consists of:

- checking emission levels,
- overloading,
- fitness of vehicles plying on road, and
- any other safety aspects

²⁵ Bhutan State of the Environment Report 2016

Production of vehicle emission test certificate is not mandatory during annual vehicle road worthiness inspections. Furthermore, traffic police is not required to check vehicle emission test certificate when checking driving license, vehicle registration certificate and insurance certificate.

The capacity of RSTA to effectively deliver on this mandate is a function of the extent of manpower availability as well as availability of supporting infrastructure. The annual report 2015-16 of RSTA indicate a shortage of manpower particularly at region and base level. Stakeholder consultations have also indicated that there is a lack of required infrastructure such as weighbridges over check points, portable weighing scales, provision for truck by lanes for inspection on highways, speed monitors/guns, breath analyzers, intercepting vehicles, modern surveillance tools for effective enforcement of rules.

- Unorganized logistics sector

Transport is the most important component of logistics services in Bhutan. Other logistics services, such as storage, handling, loading, inventory holding and planning are not developed and available in Bhutan. As per the findings of diagnostic trade integration study, the transport industry is fragmented and dominated by small owner operators. Only few transport companies with more than 20 trucks exist. Most of truck fleet registered in Bhutan are two axle that can carry a maximum load of 10 tonnes. Bhutanese companies usually contract external transport services. Only two warehousing companies use their own trucks for delivery and transport services.

Large manufacturers and traders arrange transport and clearance services themselves and do not use the services of a logistics service provider. The demand has grown but the transport and logistics industry has not developed accordingly and cannot offer high quality service. There is a lack of logistic infrastructure such as warehouses, unloading and loading areas, dedicated equipment such as containers, and professional handling services.

Freight transport in Bhutan is unable to compete with Indian transporters, who operate freely in the area close to the border with India and capture most of the traffic for import, export and transit. Indian transporters also play an increasing role in domestic transport as they offer better services and trucks with more loading capacity. As a result Bhutanese transporters and trucks carry only a fraction of the freight volume. This limits the economic viability of the sector and reduces the incentives for the private sector to invest in the sector.

Another issue is lack of containers. Most containers that enter country with the imports from third countries return empty to the port of Kolkata. The shipping lines allow only 14 days of use of containers for inland transport. Once this time period has passed, demurrage fees have to be paid. Exports of goods are often not readily available in sufficient volume in Bhutan, it is for this reason most of the containers return empty to Kolkata. Consequently, containers for export have to be re-imported and the costs for the importation borne by the exporter.

Transport issues are considered a high constraint by Bhutanese business; 17 per cent of the companies and 9.1 per cent of business context in general, consider transport to be main constraint for investment. The absence of a well-managed and well-functioning transport and logistics industry in Bhutan adds to negative impact caused by the rugged topography and the difficulty of access due to the land locked nature of the country, and further increases transport costs and time.

4.4. Policy interventions required

- Road asset management system

Historically, various countries around the world have focused more towards asset creation with little or less efforts made on asset maintenance. This creates a vicious cycle where asset is built but neglected and eventually requires rebuilding. The opportunity cost for maintaining roads at an acceptable service levels are very high. For instance, the funds deployed for building roads in a rural district could be deployed for providing better education or healthcare benefits or say electrification of powerless villages which also have wide socio-economic benefits. Therefore, it is the responsibility of governments that improving accessibility should not be seen with an outlook of one time investment but from an asset life cycle perspective and thus adequate attention should be paid towards identifying ways and means through which such roads will be maintained. Bhutan also needs to be conscious towards its road asset management strategy. In this regard, learnings can be drawn from the examples of Argentina and South Africa.

Case Study 1 - Performance based contracts system for road maintenance in Argentina²⁶

The National Directorate of Roads of Argentina (DNV) with support from World Bank adopted a new type of performance based maintenance contracts, comprising both rehabilitation and maintenance concession called “CREMA” (Spanish name for “Concession de Rehabilitacion y Mantenimiento”). The contracts require the contractor to rehabilitate and then maintain a network of roads over a period of five years for a lump sum amount. They further specify required road service outputs, and use incentive-based payments to ensure the quality of the works. Rehabilitation and maintenance indicators are kept to the minimum and are easy to monitor and measure: indeed, throughout the contract period, rehabilitation works must meet or exceed the minimum thickness of overlay and must comply with the maximum level of roughness, rut depth, cracking, or raveling; regular monthly visual inspections of maintenance activities focus on a few essential items (about 10) in ensuring compliance with the specifications: no potholes or unsealed cracks, no excessive rutting, good condition maintained on shoulders, culverts and drains, guardrails, vertical and horizontal signs, as well as on the road side environment.

The experience of Argentina underpins the following:

²⁶ http://www-esd.worldbank.org/pbc_resource_guide/Case-Argentina.htm

- There is a consciousness of the government to focus on the entire life-cycle costs and therefore needs sustained funding
- Efficiencies of the private sector are well tapped by bringing in contracting structures that are performance/ incentive linked and not efforts or inputs based
- Quantitative performance measurements also brings a clear accountability system

Case Study 2 - Commercial Management of National Road Network in South Africa²⁷

South Africa established a national road agency called SANRAL, which was a limited liability company owned by the government. The ownership of all national roads were transferred to this entity and it was made responsible for satisfactory performance of these assets.

The agency is governed by an 8-member board that comprises 2 government officials appointed by the Minister of Finance and Minister of Transport, 5 private members appointed by the Minister of Transport, and SANRAL's chief executive.

Spending is prioritized and justified by holistic economic life-cycle costing. Management of assets is financed by a judicious mix of the national budget and user toll revenues and borrowing, mostly secured by road assets and sovereign guarantees. Over the last couple of decades, the entity has not only been able to fund and manage its existing road asset but has also ventured towards investing in expanding its road network.

SANRAL is run like a semi-private company, operating under a shareholder agreement and a performance agreement to manage the national roads. It must adhere to the Public Financial Management Act (PFMA) because it is executing public funds, and must follow financial reporting requirements under the Companies Act. However, as a company it may operate with its own procurement rules that comply with PFMA, and human resource policies which permit performance incentives and market-based remuneration.

Case study 3 - Routine maintenance by Community Based Micro-enterprises in Peru²⁸

In Peru, the Rural Roads Project (RRP) has set up a cost-effective routine maintenance system based on contracting out labour-intensive maintenance works to micro-enterprises, local co-operatives and other community based organisations. The composition of these entities varies according to the size of the road. Their average size is about 13 people and the average length of the road covered is about 36 km. Priority is given to unemployed people with prior experience in construction works.

The micro-enterprises are engaged through performance based contracts with the Peru Roads Department and paid on a monthly basis. The micro-enterprises are self-governing, and determine how the monthly payment is allocated to the various uses: wages, tools, rentals, transportation, savings and other investments.

²⁷ World Bank paper on Road Asset Management

²⁸ IDFC Infrastructure Report 2007

Micro-enterprises carry out simple works continuously throughout the year, to clean the ditches and culverts, control vegetation, fill potholes and ruts, maintain the surface camber, remove small landslides, and undertake other emergency works.

Bhutan also needs to institute a proper road asset management system. This will involve specifying asset performance indicators for each road class, developing a scientific assessment of present conditions and determine its priorities for maintenance interventions on rational basis.

As a first step in the direction, all information pertaining to the consolidated inventory of road assets needs to be maintained and updated at regular intervals. GIS platform can be very effectively used to develop and maintain such information records for all kinds of roads i.e. from farm roads to the national highways. It is suggested that MoWHS while developing these roads should prepare an asset management plan, which should at least include:

- Inventory of assets
- Present condition of its network including bridges, tunnels developed alongside
- Assessment of extent of maintenance required based on factors such as present and projected traffic volumes, local weather conditions, relative importance of such road, etc
- Annual maintenance plan based on budgets available or allocated
- Impact on deterioration and performance of the road network for which funds are not available
- Present techniques of incident management including disaster management and accident management, particularly for its national highways

Further, Bhutan can learn from the above cited case studies and can adopt a similar structure for management of its national highway network which is presently estimated to be nearly 2,400 kms and will be expanded by another 500+ kms after completion of SEWH. Given the projected increase of traffic on these primary roads, RGOB can explore the commercial viability of structuring them on toll-operate-transfer (TOT) model for say a defined concession periods of 15-20 years. If tolling is commercially viable, these roads would not only save RGOB's expenditure which is presently allocated towards routine maintenance but also generate surplus funds which can be utilized towards future expansion and maintenance of other roads including making them all-weather connectivity. Alternately, the government can give these roads on performance based maintenance contracts to private sector. The model can be undertaken through a special purpose vehicle company (similar to South Africa's SANRAL) to give it more freedom in day to day management. This will not only harness private sector efficiencies in management but also reduce the extent of manpower presently deployed by government agencies towards maintenance and management of these roads and channelize their utility towards other government agendas.

- Improving transport service delivery

As presented earlier, the inter-dzongkhag public passenger transport system in Bhutan is primarily undertaken through privately run buses or taxis. The bus network originates from all Dzongkhags however, concentration of routes is primarily on western parts primarily due to better demand. The issue with bus transport system in Bhutan currently is the low levels of service more particularly in eastern part. Certain OD combinations have just one operator operating once a day and sometime once a week. This results in low levels of predictability with greater likelihood of service disruptions.

In many countries, trucks and pickups are used to transport people on rural roads; particularly roads in poor condition. Countries like Fiji, Indonesia, Myanmar, Papua New Guinea use light trucks and pickups fitted with sideways facing bench seats, allowing passengers to be seated but also allowing reasonable freight volume to be hauled. These are regulated as public transport vehicles.



Figure 20: Pictures of typical rural transport services

Source: Provision for Rural Transport Services: User needs, Practical constraints and Policy issues, Paul Starkey, www.unescap.org

The main advantages of such configured trucks and pickups are that the clearance, wheelbase and power of vehicles makes it easier for them to pass on poor roads. Also the flexibility of the configuration allows the vehicles to be used for passenger, transport, freight transport and mixed transport. Also, the transport market is relatively small and has a seasonality factor as well. Passenger trucks and pickups are better placed to respond to such changes than more specialized passenger and freight vehicles.

There are rural taxis also that operate like low-capacity feeder bus services. Generally, rural taxis operate on routes that do not have competing bus services. RGOB has also acknowledged the distinct advantages of having a smaller vehicle for inter-gewog connectivity. It is understood that on certain areas such as Samtse, private operators are running smaller vehicles like Bolero for commercial purposes. At other places, power tillers are being used. It is clear that wherever there is a market, private sector would get attracted and create a business model which benefits the society at large. The concern however remains on certain parts of the country where there is low population density and therefore private sector may not be very forthcoming for undertaking commercial operations.



Source: www.thesoulspoon.com; www.keithlane.com

To resolve such a challenge, the government would need to intervene. One way could be using the Boleros available within each gewog under the Local Government and developing service model using local community participation. From a policy perspective, the focus of RGOB should be towards setting the minimum service level standards for each Gewog and Dzongkhag. The approach towards providing such service could be a blend of public company operated vehicles or private run services. Ideally, transport operations should be best left to private sector while the government should focus on route planning and creation of enabling environment. Various approaches could be adopted for delivery. Developing of route dispersal guidelines with bundling of profitable and unprofitable routes is one such approach. Alternately, the government can support specific routes with a viability gap funding or through fiscal incentives. In areas where bus/ mini-buses are not viable, similar delivery models could be developed using smaller vehicles such as Boleros with an intent to augment services with medium or large buses as and when the demand justifies the case.

- Enhancing road safety

While RGOB has taken various measures towards ensuring road safety, there is still a long way to go towards ensuring citizen safety. It is essential that all stakeholders from administrative agencies and regulators to contracting agencies and road users acknowledge their role in ensuring road safety.

From an administrative perspective, aspects of road safety is handled by RSTA which is formed through a Road Safety and Transport Authority Act of 1999. The act lays down various safety provisions such as motor vehicle standards, speed limits, driver licensing, penalties, etc.

There are various best practices from which Bhutan can learn and improve its provisions which are directed towards road safety.

Case study 1: Australia and New Zealand²⁹

²⁹ NTDPC report

Road authorities in Australia and New Zealand have committed to the Safe System approach as a conceptual framework which guides all activities relating to the provision and operation of roads.

In managing road safety, the safe system approach implies:

- Designing, constructing and maintaining a road system to reduce fatal or debilitating injury accidents.
- Improving roads and roadsides to reduce the risk of crashes and minimise harm.
- Regulating or encouraging high quality active and passive safety systems in vehicles to reduce impact forces on occupants and on struck pedestrians and cyclists.
- Managing speeds, taking into account the risks on different parts of the road system. Advising, educating and encouraging road users to obey road rules and to be unimpaired, alert and responsive to potentially high-risk situations.
- Using enforcement and penalties to deter road users from breaking the rules, including removing the privilege of road use from those who do not comply.
- Program research to identify the most cost-effective interventions for particular situations.
- Promoting public understanding and endorsement of the safe system approach, and public participation in achieving a safer road system.

Case study 2: India's amended Motor Vehicles Act³⁰

India too is following a path to systematically reduce incidence of road violation and move towards a zero tolerance on road safety. In 2016, India moved a bill to amend its existing Motor Vehicles Act. On the aspects of road safety, the bill provides for (i) amending the existing categories of driver licensing, (ii) recall of vehicles in case of defects, (iii) protection of good Samaritans from any civil or criminal action, and (iv) increase of penalties for several offences.

Driving licenses: Under the existing MV Act 1988, a driving license is valid for a period of 20 years, or till the person attains the age of 50 years, whichever is earlier. After the age of 5, the license is valid for a period of 5 years. The Bill amends this to create several categories for the validity of licenses. If the person applying for the license is (i) below 30 years, his license will be valid till he turns 40 years; (ii) between 30 and 50 years, his license will be valid for a period of 10 years; (iii) between 50 and 55 years, his license will be valid till he turns 60 years; (iv) above the age of 55 years, his license will be valid for a period of 5 years.

Recall of vehicles: The Bill allows the central government to order for the recall of motor vehicles if a defect in the vehicle (i) may cause damage to the environment, or (ii) may cause damage to the driver, or (iii) may cause damage to other road users. In such a circumstance, the manufacturer will have to reimburse the buyers with full cost of vehicle or replace the defective vehicle with another vehicle with similar or better specifications.

³⁰ Note prepared by PRS Legislative Research

Protection of good Samaritans: The Bill defines a Good Samaritan as a person who renders emergency medical or non-medical assistance to a victim at the scene of the accident. The assistance must have been in good faith, voluntary and without any expectation of reward. Such a person will not be liable for any civil or criminal action for any injury or death of an accident victim.

Penalties: The Bill has increased penalties for several offences. For example, the maximum penalty for driving under the influence of alcohol or drugs has been increased from Rs. 2,000 to Rs. 10,000. If a motor vehicle manufacturer fails to comply with manufacturing or maintenance standards of motor vehicles, the penalty may be a fine of upto Rs. 100 crore, or imprisonment of up to one year, or both.

In addition to the above, the Bill also provides for computerization and mandates state governments to ensure electronic monitoring and enforcement of road safety on national highways, state highways and urban roads. The central government will make rules for such monitoring.

Bhutan can learn from above cited best practices. It already has an agency RSTA which is responsible for various aspects of road safety. However, RSTA's role should be limited towards regulatory functions with an aim to promote road safety and improve traffic management across Bhutan (refer institutional structure chapter for more details). It should be responsible for:

- Prescribing vehicle safety standards
- Conducting audits of roads meeting safety design standards
- Road safety research
- Traffic laws, operations and management
- Capacity building
- Laying down guidelines for medical care and rehabilitation

Decade of Action for Road Safety 2011-2020

In April 2004 UN Road Safety Collaboration (UNRSC) was established to better address road safety issues. In this way the Decade of Action (DOA) on road safety has been endorsed by the UNRSC and the global plan of DOA 2011-2020 established in May 2011. In addition the global action plan recommended countries to develop their national action plan for the decade where WHO plays a key role in overall coordination responsibility. RGOB, being committed to the improvement of road safety, has developed its own road safety strategies/ action plan for 2011-2020.

The technical assistance study on road safety undertaken by ADB has given various recommendations. The recommendations are structured within the 5 pillars of DOA and are presented below.

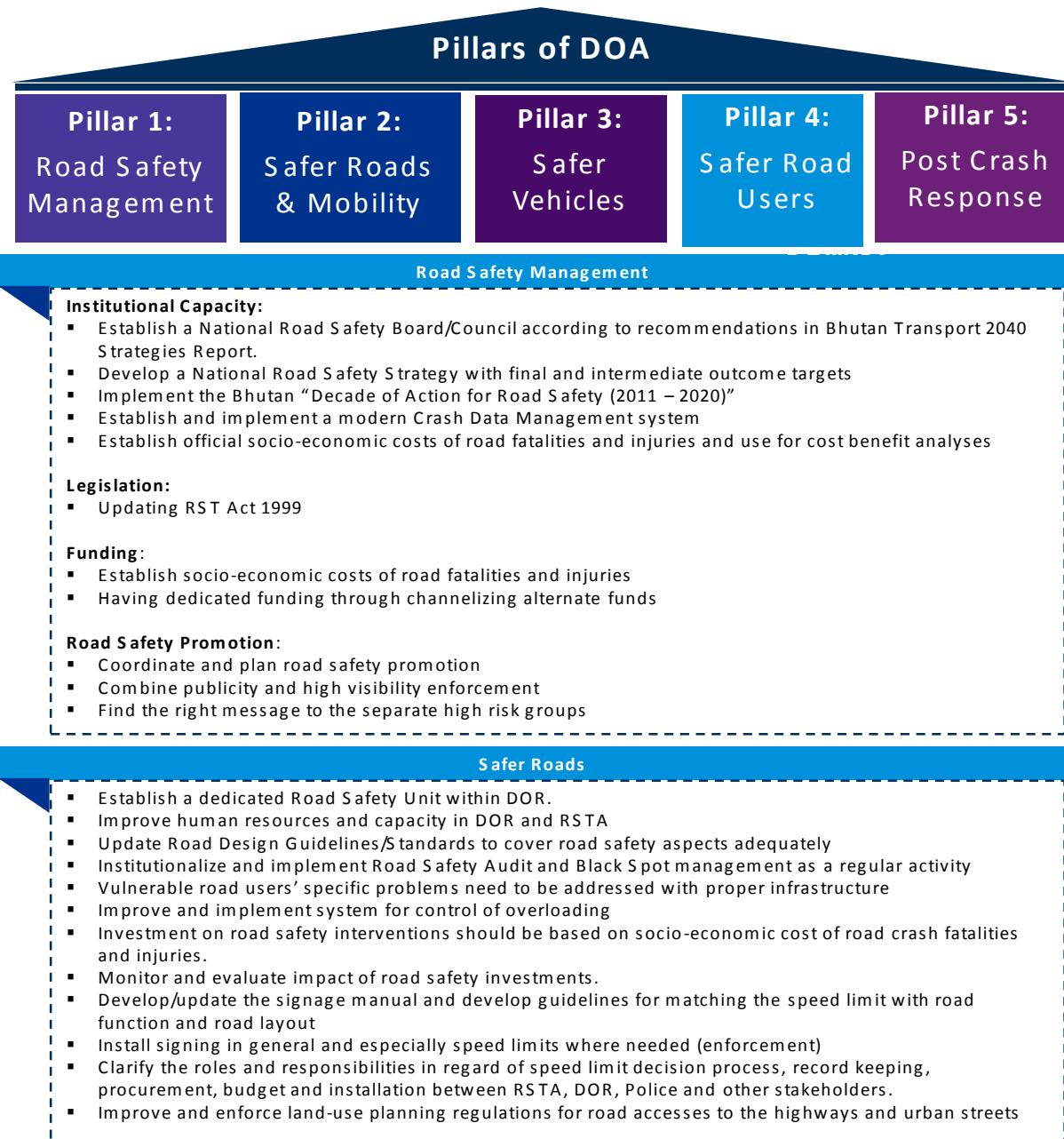




Figure 21: Pillars of Decade of Action for Road Safety

Source: WHO, ADB

Programmes such as Decade of Action on Road Safety (2011-2020) is a step in the right direction and should continue even beyond the stipulated time horizon. Bhutan can also adopt other provisions from these case studies such as that of “Good Samaritan” or stricter penalties. Further, it can institute a fund for road safety where say a certain percentage of cess on fuel should be directed towards a “Road Safety Fund” and should be available to RSTA for carrying out the above mandate. RGOB should also formulate guidelines for electronic recording of data related to road safety covering greater details beyond statistics on accidents and fatalities.

- Increase in energy efficiency of vehicles

Conservation of environment has played a central role in Bhutan's approach to economic development. Concern for the natural environment and heritage is embedded in the development philosophy of Gross National Happiness. It is enshrined in Article 5 of the Constitution of Bhutan that environmental stewardship is the duty of every Bhutanese and also a mandate for the government.

In line with the declaration made by the Royal Government of Bhutan at the 15th session of the Conference of Parties to the UNFCCC in Copenhagen, and reaffirmed in the Intended Nationally Determined Contributions (INDC) towards Paris Agreement 2015, the national GHG emissions will be less than the sequestration capacity of the sink for all times.

Despite the ongoing efforts of RGOB towards environment conservation, the pollution levels recorded are higher than the prescribed limits within Bhutan and significantly higher than the levels permitted by WHO. Since transport is one of the major contributors to this, it warrants various policy interventions that are directed towards the industry - more particularly towards improving the energy efficiency of vehicles.

Globally, a host of measures have been undertaken various policy measures towards improve vehicles energy efficiency. These policies may be intended to improve operational efficiency of existing vehicles (since fuel efficiency reduces CO₂ emissions) or to encourage purchase of fuel efficient vehicles. There are five core areas where international experience provides examples that might be helpful to consider: financial measures; regulatory standards; inspection and maintenance programme; public outreach; and traffic management. They have been applied in various forms, in a number of countries, including the US, UK, Canada, Australia, Japan, China, Singapore, Hong Kong, and South Korea. The same are outlined below³¹:

Financial Incentives and Disincentives

Initiatives involving financial measures can be grouped under the following mechanisms:

- Differential taxes and charges based on fuel efficiency or greenhouse gas emissions (or proxies such as engine size or vehicle weight).
- 'Feebates': a set of fees (surcharges) for fuel-inefficient old vehicles and rebates for the purchase of new fuel efficient vehicles, based on fuel-efficiency, GHG emission (CO₂) performance of the vehicle.
- Subsidies for purchasing alternative fuel vehicles or for converting traditional fuel vehicles to alternative fuel vehicles.
- Support to manufacturers to develop vehicles that use alternative fuels.
- Support for research and development into existing fuel enhancement and new fuel technologies.
- Mandate government agencies to purchase hybrid, alternative fuel, or efficient vehicles for agency fleets

³¹ World Bank paper on government policies to encourage energy efficient vehicles on roads by Kumar C. Sinha et al

Regulatory Standards for Vehicle Fuel Efficiency

In countries where regulatory standards for vehicle fuel efficiency have been used, it has been in the form of one or more of the following specific mechanisms:

- Foster mandatory vehicle fuel efficiency or CO₂ emission standards.
- Establishing automotive industry agreements on fuel efficiency and adaptation of efficient and innovative vehicle technology.
- Improve on-road fuel efficiency of vehicles by focusing on energy efficiency of non-engine components (generally not considered in official fuel efficiency tests), including tyres, cooling technologies, and lighting systems.
- Developing and enforcing standards on imported or used vehicles.
- Vehicle efficiency labels/ratings at point of sale/purchase.
- Implement fuel efficiency standards for heavy duty vehicles.

Inspection and Maintenance Programmes

Inspection and maintenance (I/M) programmes are a common initiative in many countries to promote greater fuel efficiency and ensure that vehicles meet emissions standards. I/M programmes have been implemented through a variety of specific mechanisms such as:

- Enforcing operational efficiency of used vehicles through periodic inspection and maintenance programme.
- Mandatory vehicle emissions inspection, targeted primarily to local air quality.
- Encouraging the retirement of old vehicles through both mandatory and voluntary programme.

The enforcement of periodic inspection and maintenance requirements has been accomplished as a part of annual registration process or the use of windshield decals indicating compliance. In the US, universal I/M programs were discontinued after public complaints and are currently administered only in metropolitan areas that are not in compliance with air quality standards. Some countries have experienced that I/M programs can become burdensome requirements for vehicle owners and thus can lead to evasion and attendant corruption.

Public Outreach and Awareness Programs

The mechanisms of public awareness campaigns, through billboards, television, print media, radio, and in-vehicle systems, have included the following:

- Provision of information to car purchasers on vehicle performance, e.g. fuel consumption labelling on vehicles, including fuel consumption data in vehicle advertisements.
- Standards/labelling requirements for non-engine components, such as tyres, cooling units and lighting, etc., which have an impact on fuel consumption.
- Communicating the range of operational efficiency of vehicles and its monetary significance to consumers/drivers, such as in-car feedback instruments for eco-driving.
- Heavy vehicle environmental rating scheme.

Highway Traffic Management

Policy initiatives in this area are directed at minimising stop-and-go operations and frequent speed changes. Fuel efficiency can be improved if a relatively smooth traffic flow can be maintained. Many countries are in the process of pursuing the following:

- Implement intelligent transportation systems in order to minimise delay and idling.
- Rapid incident detection and clearance at low capacity highways.
- Improve highway, street, and intersection design standards that foster smooth flow of traffic.
- Adopt demand management programs.
- Add physical capacity by adding lanes, bypasses, or other improvements.

Some of the measures outlined above are already being implemented by Bhutan. Differential taxes on vehicles, subsidies on electric vehicles, etc are few of such interventions. However, provisions of vehicle quotas for import of vehicles exempting payment of customs and sales tax for eligible individuals and institutions is in conflict with measures to curb the increase in vehicle numbers and thus indirectly towards controlling GHG levels.

Vehicle Scrapping Policy

In order to realize the vision of lowering emission attributable to the transport sector it is imperative that a vehicle scrapping policy be adopted which has been the practice globally. There are various mechanism to do so:

1. By recommending end of life of vehicle
2. Additionally supporting with other measures such incentives in the form of adjusting the scrap value against the purchase of new vehicles or dis-incentivizing the use of old vehicles.

Globally, there is a recognition towards End-of-Life for Vehicles. The age varies from country to country. The table below summarizes the list of ELV policy of various countries.

Country	End of Life of Vehicle (Yrs)
United Kingdom	10
India	15
Austria	13
France	10
Germany	9
Ireland	10
Japan	13
Luxembourg	10
Portugal	10
Romania	8
Russia	10

Table 6: End-of-Life of Vehicles for various countries

Source: KPMG research

Analysis of the age of vehicles in Bhutan reveals that approximately 10% of the vehicles are older than 15 years of age, which makes it prudent for the government to lay down rules/laws wherein no vehicle which is more than 15 years old, will be allowed to operate in the country and also the permit of commercial vehicles shall not be renewed. This can be further facilitated with incentives and disincentives explained above.

Vehicle emission and fuel quality standards

Given that Bhutan doesn't manufacture its motor vehicles and imports as much as 80% of its vehicles from India, stricter standards on import of vehicles need to be developed. In this direction, recent efforts of India towards scrapping of BS III vehicles and graduating to BS IV with an intent to move towards BS VI by 2020 will directly have a positive impact on Bhutan's vehicle industry. However, Bhutan needs to enforce BS IV standards for vehicle emissions, develop fuel quality standards and negotiate with oil marketing companies for a BS IV standard fuel given that it emits less nitrogen oxides, total hydrocarbon, non-methane hydrocarbons, and carbon monoxide gases.

Vehicle emission or fuel quality standards are effective only if the enforcement mechanism is strong. Therefore, standards have to be unequivocally supported with better inspection and maintenance program. Use of ICT/ Intelligent Transport Systems for efficient surveillance in highway and urban roads can be implemented by Bhutan towards making the transport industry more environmentally sensitive and sustainable. Public awareness programs should be run alongside to make users aware about the benefits of such interventions.

- **Financing for road transport and safety**

Traditionally, governments have been financing transport infrastructure investments via public resources for which different funding options are possible. It is also well known fact that while these funding sources are critical, however, they are not sufficient. The public funding usually has two main types of sources of funding they are a) Domestic funding and b) External funding. The domestic funding is largely generated through various taxes such as vehicle tax, fuel tax, road tax, etc or through domestic borrowing i.e government bonds whereas external funding includes external borrowing i.e IFI loans and grants.

Bhutan will need finances not only to fund road infrastructure and transport system development but also towards its maintenance as well as for implementing various road safety programmes. Some countries have been very effectively utilizing the private sector participation models for financing such infrastructure. India for instance has evolved its PPP models particularly in the road sector. From the traditional annuity or design, built, finance, operate, and transfer (DBFOT) structures to recently crafted hybrid annuity models are various approaches that India has developed in response to the market conditions. Its highway development agency, NHAI is also planning a toll-operate-transfer (TOT) model for the assets which were developed through public finances and have seen a fairly stabilized operations and traffic levels lately.

Bhutan, which already has a well laid out PPP policy in place, can learn from such experiences globally. It can explore a suitable PPP structure for its operational network of national highways. From a policy perspective, RGOB can provide an enabling environment by way of creating model concession agreements with a balanced risk sharing mechanisms, standardizing of procurement conditions, carrying out of value for money analysis, etc so as to develop a robust PPP mechanism in the country and strengthen road development agencies such as MoWHS to test such models. A successful PPP model will provide Bhutan much needed private sector capital that will enable the state finances to be channelized towards other priorities.

Given that private sector financing will remain confined to commercially viable projects, the government should explore other financing options as well. RGOB already imposes a 5% green tax on fuel. The practice is in line with other countries globally and should continue. India for instance imposes a Rs. 2/ltr cess on fuel, the proceeds of which go towards a Central Road Fund, which is used for construction and maintenance purposes. Similarly, they should institute a fund towards Road Safety, the proceeds of which should be channelized for developing and implementing road safety programmes.

- Human resource development

While undertaking stakeholder consultations, a common theme that emerged from discussions was the need to improve the capacities of the institutions delivering their respective mandate. Be it the capabilities of various departments under MoWHS responsible for execution of road building program or the capacity of RSTA to enforce its mandate or of NEC to prepare relevant regulations, human resource development is required across all spheres. It is therefore imperative that a high priority is accorded to build capacities of these institutions.

As a first step in this direction, a comprehensive assessment on the level of training required across all levels must be undertaken. Higher priority could be accorded to the training needs of institutions such as MoWHS, MoIC including RSTA, RBP and Local Governments which are directly involved towards planning and implementing various aspects of surface transport. For imparting relevant training programs or conducting study tours, RGOB can look at partnering with various academic institutions in SAARC countries such as India, South-East Asian countries such as Thailand or countries with prestigious universities such as US, UK and Australia. For instance, Indian Academy of Highway Engineers (IAHE) is the apex institution for training of highway engineers, functioning under the aegis of MoRTH. Sufficient funds need to be budgeted for conduct of such trainings.

- Improvement in logistics industry

As indicated earlier that, Bhutan lacks critical logistics infrastructure. In order to fill this gap, RGOB has taken certain steps. The government plans a distribution and warehouse centre in Phuentsholing, which would combine clearing and logistics facilities and also act as a dry port, mainly for transit goods from third countries. However, more such infrastructure is required to be developed along the border towns especially to reduce dependence on Phuentsholing border crossing point as well as bring about trade induced

economic growth in broad based and equitable manner. The logistics infrastructure will support new industrial developments planned along the border towns as well as within Bhutan.

Chapter 4: Urban Transport

Urban Transport (UT) covers a variety of intra-city transport for people and goods, including non-motorized transport such as walking, cycling, skating; private personal transport which could be rail or bus based and para transit transport modes such as taxis. The defining trait of UT is the ability to support higher densities in urban areas by efficiently and affordably moving people and goods through and in the city. The UT solutions are unique in a way that they not only have to look at the efficiency in terms of time and cost and convenience of each mode but also the inter-dependency of one mode on other. For example a highly efficient Bus Rapid Transit system could be made ineffective if feeder services are weak.

Also, it is urban transport which contributes to traffic congestion, energy dependence and other social concerns such as safety and health, if not planned effectively. In terms of health related impacts of transport in urban areas, vehicular pollution has emerged as one of the top contributors to air pollution globally. In the absence of adequate provision of UT infrastructure including public transport, congestion, diseconomies can outweigh the benefits of agglomeration in urban areas. Hence, urban transport's role in supporting economy is significant and thus is an important transport subsector of the country.

4.1 “As-Is” assessment

- Urbanization trends

The present population of Bhutan is 768,577 which consists of an urban population base of 307,431. While the total population of Bhutan has grown at a CAGR of 1.6% since 2006, the growth rate of urban population has been 4.2% p.a. in the same period.

As a result of this growth, the share of urban population in the overall population of Bhutan has grown from 32% in 2006 to 40% in 2016. The year on year urbanization trend of the last decade is shown in the table below.

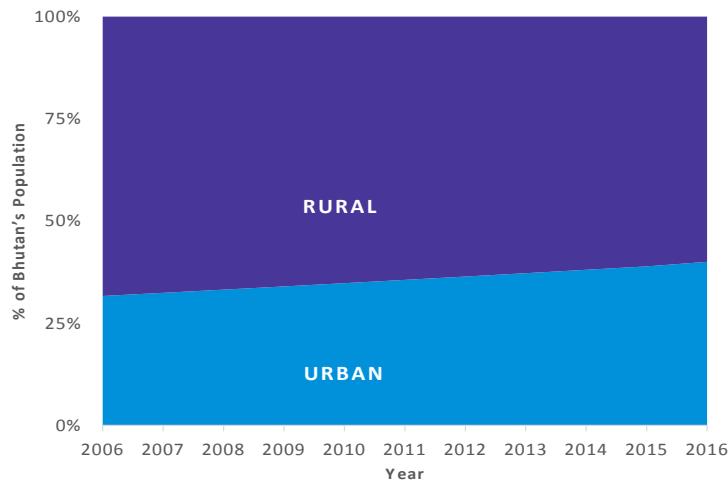


Figure 22: Rural-Urban distribution

Source: Dzongkhag Population Projections, 2006-2015, NSB, RGOB, Annual Statistics Yearbook 2016

■ Urban centers of Bhutan

Presently, there are four major urban centers in Bhutan, they are namely Thimphu, Phuentsholing (P/ling), Gelephu and Samdrup Jongkhar (S/Jongkhar). The capital city, Thimphu with 127,864³² population is the largest urban center in Bhutan and accounts for 17% of Bhutan's overall population or 41% of Bhutan's total urban population.

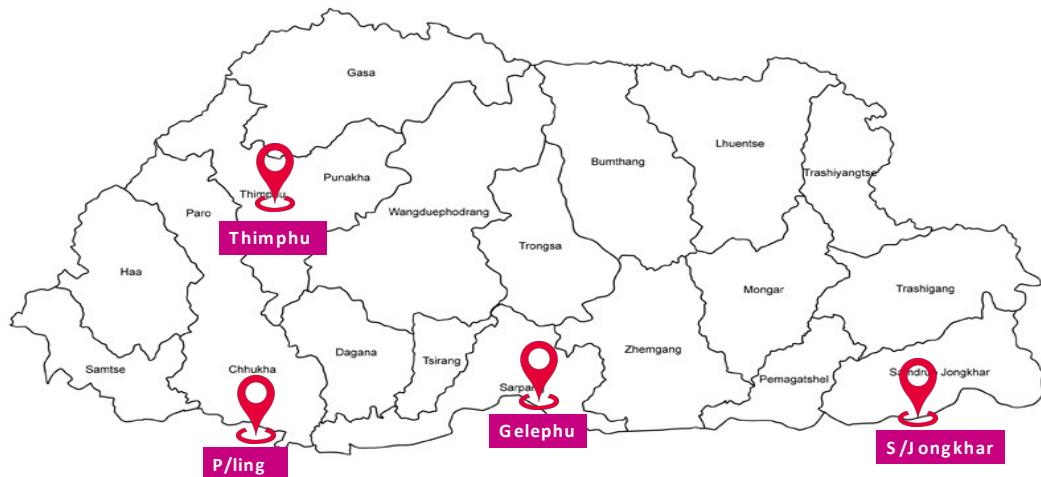


Figure 23: Major urban centers of Bhutan

Source: Bhutan Transport 2040 Integrated Strategies Vision,

The population of P/ling city is 23,925. Similarly, the population of Gelephu and S/Jongkhar is 13,339 and 10,545 respectively³³. These urban centers of Bhutan together account for 57% of Bhutan's urban population.

³² National Statistics Bureau

³³ The population estimates of various urban centres are not available for a consistent period. While the available estimates for Phuentsholing is for year 2015, for Gelephu & S/Jongkhar, the latest available estimates are of 2014 and 2011 respectively.

- Transport service delivery

The transport in major urban centres of Thimphu and Phuentsholing is provided predominantly by buses and para transit transport. In smaller urban centres, taxi is the primary mode of transport. The institutional buses include buses provided by enterprise as well as school buses to pick and drop children to and from schools.

Bus transport

Bus services are presently provided in Thimphu and Phuentsholing. While Thimphu has a service model delivery by both public sector and private operators, Phuentsholing is operated by public sector buses. ‘City Bus Service’ is an arm of Bhutan Postal Corporation, a state owned enterprise.

The annual ridership of bus transport service in Thimphu and Phuentsholing is 940,000 and 114,795 in 2015³⁴ respectively. The bus services in Thimphu and Phuentsholing is provided by fleet of 58 buses. This includes a fleet of six buses operated by private bus operators which ply on select routes in Thimphu.

Operator	Fleet
Thimphu	
City Bus Service	48*
Private players	6
Sub Total	54
Phuentsholing	
City Bus Service	4*
Sub Total	4
Grand Total	58

*Includes 16 new buses and 2 new buses recently purchased and added to Thimphu and P/lng fleet

Table 7: Fleet size of city bus service in Thimphu and P/lng

Source: Primary consultation

The bus service in Thimphu presently operate on 12 routes whereas on a single route in Phuentsholing which calls for bus route rationalization to have more bus routes on account of compact size of the urban centre. The average daily ridership of bus services in Thimphu and P/lng is approximately 2,600 and 320 commuters per day respectively which translates to a modal share of 2% approximately for both cities. The city bus service has recently augmented its fleet size by 18 modern buses.

Out of eighteen (18) modern buses, sixteen (16) buses have been added to Thimphu’s fleet whereas two (2) buses have been added to P/lng fleet. Prior to addition of new buses, the city bus service was operating at a service headway of 15 minutes during peak hours which is expected to be reduced to 10 minutes with fleet augmentation. The headway needs to

³⁴ Annual Info-comm and Transport Statistical Bulletin, Edition 6, 2015, MoIC

be further reduced in response to passenger demand in order to attract passengers from other modes especially taxis. It may be noted that the City Bus Service is presently subsidized by the RGOB.

A snapshot of city bus coverage and performance in Bhutan is provided herewith.

Performance Parameter	Actual	Desirable	Remarks
<i>Number of buses per 100000 population</i>	42	60	-41%
<i>Average age of buses</i>	7+ years	<4 years	-75%
<i>Fuel efficiency</i>	4 Km/litre	4-4.2 Km/litre	Meets
<i>Fleet utilization</i>	78%	>90%	Low
<i>Bus productivity</i>	46 Km/day	100 Km/day	Low

Table 8: Performance Snapshot of City Bus Service in Bhutan

Source: KPMG Analysis

It can be observed that the current fleet of city bus service is small as compared to the benchmark requirement of around 60 buses per 100,000 population. The average age of the bus fleet at 7+ years is also significantly higher than the required standard of less than 4 years. The fuel efficiency of these buses at 4 km/ litre is as per the desired benchmarks. The present fleet utilization at 78% is also lower than the desired average of 90%. With regards to bus productivity which is measured based on operating kilometers per day per bus, the figures at 92 km/day show a significantly low utilization against the benchmarks of 100 km/days for hill towns. Shimla, a hill town in India achieves a bus productivity of 98 km/day. This shows the potential for improving efficiency.

Taxi transport

With rise in tourism, taxi services have been in strong demand amongst urban centers. Further, the rising affluence as well as absence or less reliable city bus service has also resulted in people preferring taxi as mode of commute within cities. As of 2016, total number of taxi registered in Bhutan is 4,787. Out of total registered taxis, 91% of the taxis have been registered in Thimphu and P/ling.

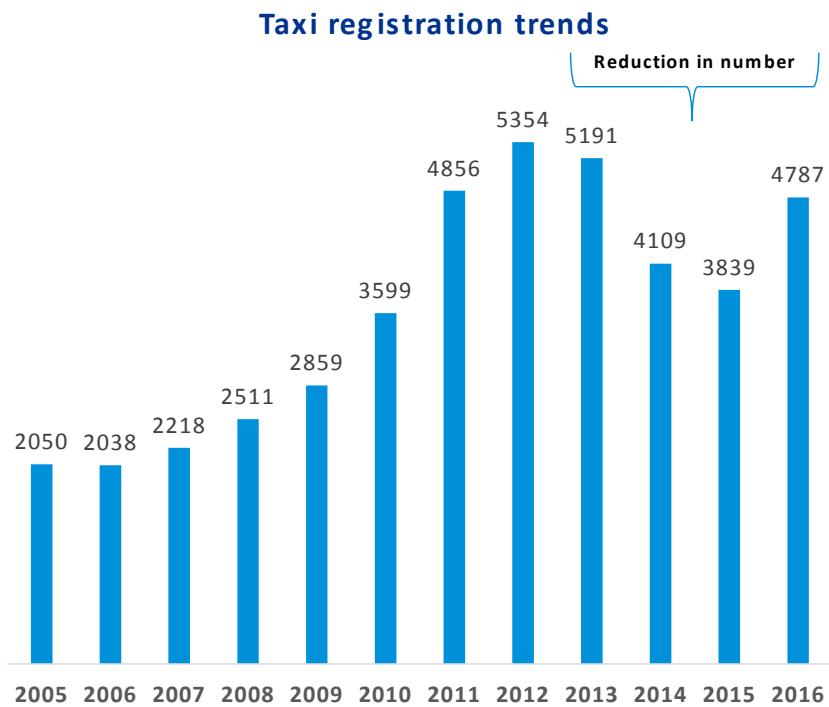


Figure 24: Registered taxis in Bhutan

Source: RSTA Annual report FY 2014-15

The number of taxis per 10,000 population in Thimphu is around 250 which is over six times higher than the optimal level³⁵. The registered number of taxis have been reducing since 2012. The new taxi registrations were stopped by RSTA from 2012 which continued till 2015. However, the registrations have started again in 2016 and that explain a spurt in taxi growth in year 2016. Interestingly, over 86% of the total registered taxis are run on petrol engine. This is very different from trends in other parts of the world where taxis are mostly run on diesel due to its relatively better fuel efficiency.

Institutional Buses

Besides the above two modes, the third mode of commute is the use of institutional buses i.e. buses operated by government departments or schools or other institutions.

- **Private transport**

In recent years, the vehicles have grown at a rapid pace - from 11,916 in 1990 to 83,004 by 2016. This clearly shows the rising trend of motorization in Bhutan. The key drivers for the increase in motor vehicles are economic growth resulting in better financial positions of households, improvement of road network within the country and also inadequate levels of public transport.

The figures below show the year on year motor vehicle registration trend over the last 12 years. As observed, the vehicles grew at a CAGR of 10%. It may be noted that RGOB had

³⁵ Bhutan Urban Transport System, IFC, 2012

imposed a ban on import of non-necessary items in 2013 on account of Indian rupee currency crisis. The ban was lifted in 2013 and since then the vehicle import growth has been increasing again.

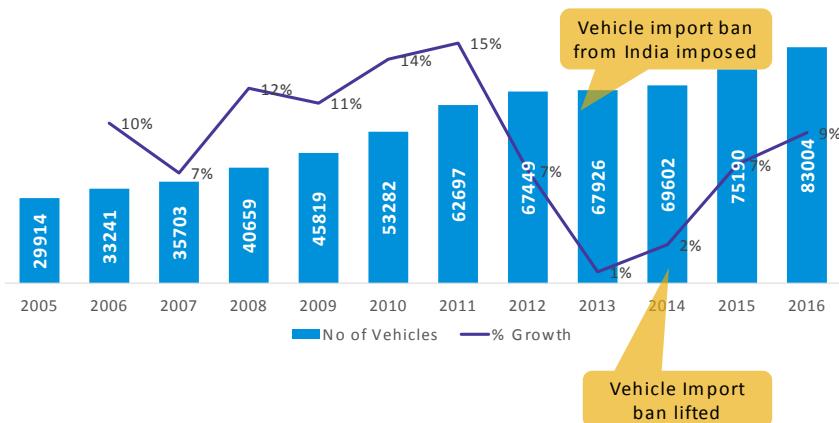


Figure 25: Motorization growth in Bhutan

Source: RSTA as of October 2016

There are five main vehicle registration centers in Bhutan, they are Thimphu, P/ling, Gelephu, S/Jongkhar and Mongar. Thimphu and P/ling account for 88% of motor vehicles registered in Bhutan, thus indicating lopsided vehicle distribution towards main urban centers of Bhutan.

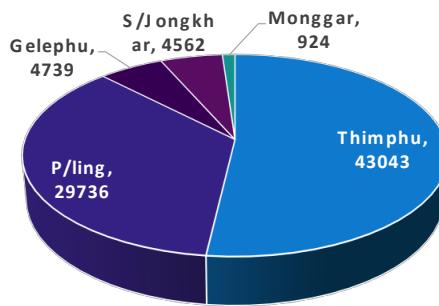


Figure 26: Vehicle registration distribution in Bhutan

Further, RSTA classifies motor vehicles into seven major categories viz. Heavy vehicles (HV), Medium vehicles (MV), Light vehicles (LV), Taxis, Agri-equipment, Electric Vehicles and Two-wheelers. The LV segment comprises of private cars alone contributes to 64% of the overall motor vehicles registered in Bhutan. Private cars and two wheelers together make it nearly 75% of total vehicle mix. The LV segment has been growing at CAGR of 8% in

last five years. Despite the various incentives offered to promote electric vehicles, there are only 92 electric vehicles registered in Bhutan by 2015.³⁶

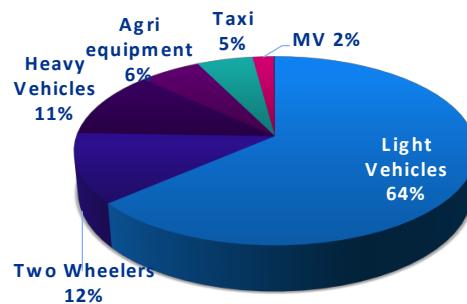


Figure 27: Composition of Bhutan's vehicle population, 2016

Source: RSTA

Out of total light vehicles registered in Bhutan nearly 60% of vehicles are petrol engine driven while almost 40% are diesel engine. Bhutan currently is governed by Euro III emission standards, therefore more diesel engine driven vehicle composition in overall inventory of registered vehicle could be concern as internationally diesel is proven as a more polluting fuel and governments are encouraging shift to petrol engine driven vehicles. It may be noted that almost 80% of the light vehicles are imported from India while another 10% and 7% come from Japan and Korea respectively.

Import of Light Vehicles

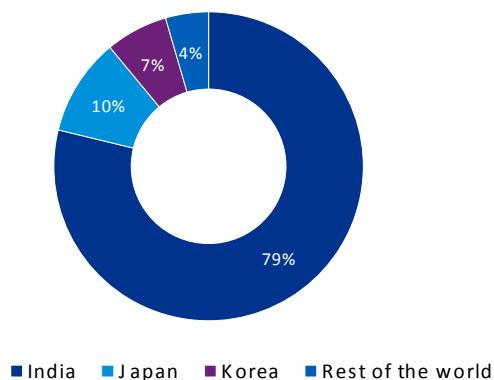


Figure 28: Countries from which light vehicles are imported

Source: RSTA

- Transport modal split in various urban centres

³⁶ Annual Statistical Handbook, 2016

RGOB carried out urban transport study in 2009. As per the study, walking is predominant mode of transportation in Thimphu and has a share of 48% amongst various other the modes of transport.

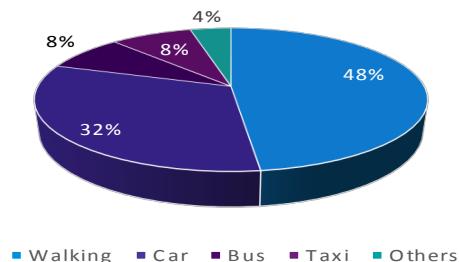


Figure 29: Modal split in Thimphu, 2009

Source: RGOB study on urban transport

While comparing the modal share with prominent cities globally, the walking percentage in modal share of Thimphu is significantly high and showcases its unique urban structure of Thimphu were most of the services are located at walking distances.

Sr No	City	Area Sq km	Population (In Mn)	Private transport	Rail	Taxi	Bus	Walk	Cycle & Others
1	Bogota	1,775	6.8	15%	NA	4%	62%	15%	4%
2	Curitiba	430	1.9	28%	NA	NA	45%	21%	6%
3	Hong Kong	1,104	7.1	11%	25%	8%	55%	NA	1%
4	London	1,579	7.8	40%	12%	1%	15%	30%	2%
4	Mumbai	603	12.5	15%	45%	7%	NA	27%	6%
5	Osaka	222	2.7	39%	32%	NA	2%	27%	NA
6	Seoul	605	10.6	26%	35%	6%	28%	NA	5%
7	Singapore	712	5.1	29%	19%	4%	25%	22%	1%

Table 9: Modal share observed across prominent cities of the world

Source: <https://www.lta.gov.sg/ltaacademy/.../J11Nov-p60PassengerTransportModeShares.pdf>

While more recent statistics are not available, it would be reasonable to assume that the share of walking is expected to have decreased owing to the growth in motorized transport and city's urban sprawl to sub-urban areas. However, it is expected to still be a dominant mode of transport in Thimphu and Phuentsholing owing to compact structure of cities.

- Road network across urban centres

With the growth in urban population, the demand for transportation has also grown in the urban centers. The growing motorization trends in Bhutan is an indicator of growing use of private modes of transport and thus would require commensurate expansion of urban road network to support this growth.

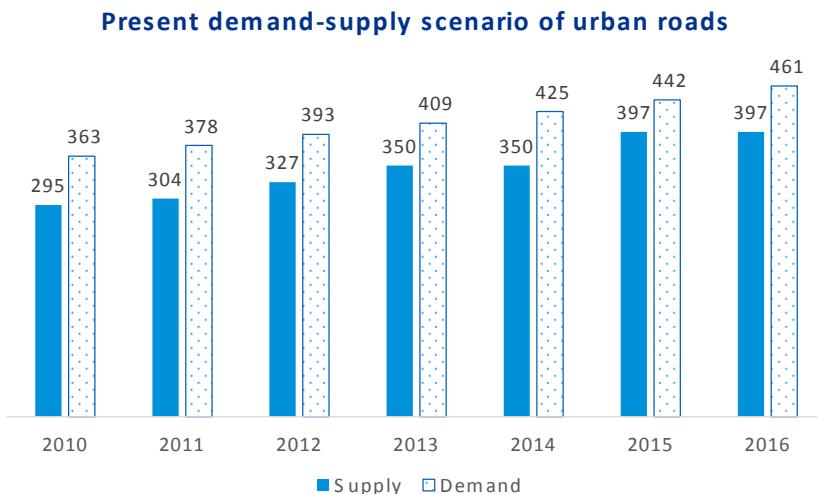


Figure 30: Growth in urban road network in Bhutan
Source: Statistical Yearbook 2016, NSB, Thimphu Road Improvement Plan, ADB

Current length of total urban road network is 397 km³⁷. The urban road network has grown at a CAGR of 6.1% in the last seven years. However, there has been no urban road network expansion in last one year. For a middle income economy like Bhutan, it has been globally observed that per capita urban road length requirement is in range of 1.5 m-1.7 m³⁸. Based on this thumb-rule, there is an estimated shortfall of 64 km of urban road network to support the present urban population of Bhutan.

	Network length (in Km)	Per capita Road length (in m)	Excess/Shortfall (in Km)
Total Urban Road Network	397	1.3	-64
Thimphu	250	2.0	+58
S/Jongkhar	28	2.7	+12
Gelephu	20	1.5	0

Table 10: Present state of road network in major urban centers

Source: Thromde websites, KPMG Analysis

Note: P/Ling statistics not available

It is evident from the above analysis that currently, the per capita road length in Thimphu and S/Jongkhar have road network well above the established standard whereas Gelephu is adequately meeting the standard for now. Thus, the shortfall in urban road can be explained on account of requirement of urban roads in other emerging urban centers of Bhutan.

- Other Transport infrastructure

City bus infrastructure

³⁷ Statistical Yearbook 2016, NSB

³⁸ Thimphu Road Improvement Plan, ADB, 2015

The bus terminal apart from serving as the origination and termination point for buses also serve as pick and drop points for taxis. The bus stops are not designated and only consists of signage devoid of shelter, seating area, provision for lighting, surveillance aids etc.



Figure 31: Bus stop signage
Source: KPMG

in Thimphu

The city bus service has already identified 140 likely bus stop locations out of which 70 locations have been identified as feasible for development of bus stops with adequate facilities. ITS feasibility study as well as action plan, 2015 also suggest development of bus infrastructure as one of measures to boost ridership. UNDP and World Bank funded a study in assisting RGOB in developing a concept design as well as prototype of model bus stop. The model bus stop has already been built at Changji Theatre in Thimphu³⁹.

Parking

With increase in motorization, parking demand has also increased especially in city centers, commercial centers and other location of public interest. Land is a valuable resource in all urban areas. Provision for parking occupy large portion of such land. Parking demand is typically insatiable. It entails enormous cost and uncontrolled parking supply encourages car dependency. Hence, the city authorities and urban planners globally have been focusing on demand management instead of parking supply augmentation. Unlike bigger metropolitan cities, the parking problems in the urban centres of Bhutan is not yet insurmountable. For instance, in Thimphu, the parking problems is largely confined to the city center area where on street parking leads to traffic congestion. The town has currently 1,429 public car parking and 155 two-wheeler parking in the city against over 83,000 vehicles registered.



³⁹ www.unct.org/

Figure 32: On-street parking in Thimphu
 Source: KPMG

Category	Vehicle Parking Spaces	Two Wheeler Vehicle Parking Spaces
Parking in City Center		
Parking on Norzin Lam	252	12
Parking spaces within On-Street Parking areas	630	39
Parking spaces within off-street Parking facilities	106	19
Parking outside city center		
Parking near Memorial Chorten and Sunday Market	441	85
Total	1429	155

Table 11: Parking Slots in Thimphu, Bhutan, 2014
 Source: IM, Development and Management of Integrated Parking System in Thimphu under PPP mode

Out above-mentioned car parking slots, around 988 car parking slots and 70 two-wheeler parking slots are located within city centre of Thimphu. About 92 car parks and 5 two-wheeler parks are operated by private entities whereas rest being operated and managed by Thimphu Thromde. Thimphu Structure Plan (TSP) 2004 proposed pedestrianizing Norzin Lam and provision for improved off-street parking facilities in the Thimphu City Center. Thus, Thimphu Thromde in order to improve traffic flow and to create additional parking spaces within the existing off-street parking facilities is developing two Multi-Level Car Parks. The two MLCPs with combined capacity of 600 car parks will be developed on PPP mode and for a concession period of 22 years. The concession has already been awarded and MLCP are currently under construction. Lately, Thimphu Thromde has also started taking measures to remove on-street parking in core city areas as a step to resolve congestion issues.

EV quick charging points

RGOB has been promoting use of electric vehicles since 2013. The initiative has been launched to align with country's commitment to address environmental issues and reduce dependency on fossil fuel. The government has announced an ambitious plan to transform

Thimphu into first electric city of the world and reduce fuel imports by 70% till 2020. In this direction, it has taken various measures. This includes bringing international electric car manufacturers such as Nissan and Mahindra to Bhutan and also promoting domestic e-car players such as Thunder Motors. It incentivizes import of electric vehicles by granting 100% exemption from Sales tax, Customs duty and Green Tax. Besides this, it has also developed six quick charging stations in Thimphu and Paro i.e 4 in Thimphu and 2 in Paro and has signed Memorandum of Understanding (MoU) with Nissan and Mahindra to develop quick charging infrastructure in Bhutan.

4.2 Urban scenario by 2040

- Population by 2040

Bhutan's population is expected to grow to 960,000 by 2040 from current population of 768,577 i.e. CAGR of 0.92%. It is expected that urban population of Bhutan will constitute 70%-72% of Bhutan's total population by 2040. This implies that the urban population will reach near 670,000 from present number of over 300,000 i.e. CAGR of 3.3%. Thimphu shall be major urban center of 2040 and its population shall be 31% of Bhutan's urban population taking it to 208,000.

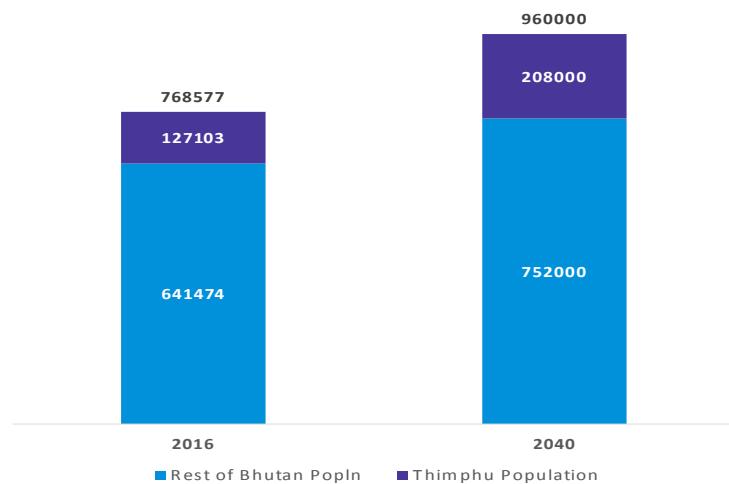


Figure 33: Population projection for Bhutan as well as Thimphu by 2040
Source: KPMG Analysis

TSP 2004 had estimated Thimphu city's capacity to handle 107,000 population. Thus in order to accommodate projected population which is almost double the capacity, it will be imperative to undertaking planning for development of Thimphu on North and South.

- Urban centers of 2040

While there are a total of 4 main urban centers in Bhutan presently, by 2040 the number is expected to grow to 14. Thimphu is expected to remain as the major urban center of Bhutan by 2040 and spillover of Thimphu's growth will result in urbanization of Punakha as well as Wangdue. As the population grows, the urbanization shall also move towards border areas, road corridors as well as potential tourist destinations. Nganglam is an emerging urban center on account of rapid industrialization as well as trade growth between India

and Bhutan. Trashigang and Paro are emerging urban centers on account of tourism development.



Figure 34: Existing, emerging and potential urban centers of Bhutan, 2040
Source: Bhutan National Urbanization Strategy, KPMG Analysis

Samtse and Gomtu are identified as potential urban destinations owing to its location at the border, proximity to existing urban center Phuentsholing as well as planned South East West Highway connectivity. Geleposhing and Bumthang are expected to be urbanized mainly on account of tourism development. Trongsa is another potential urban center which has potential to emerge as urban center on account of tourism development as well as development of key road links to Wangdue, Gelephu and Nganglam.

- Urban road network requirement by 2040

With growth in urban population as well as setting up of new urban centers, there will be need to construct new urban roads as well as upgrading existing roads. Based on estimate, the requirement of the urban roads is expected to increase to 1,006 kms i.e. increase of 609 km road length from current network length⁴⁰.

Thimphu city itself shall require additional 50-60 kms of road network by 2040 over and above the current road network length of 250 km. The proposed growth in road network in Thimphu is required to be undertaken on North and South of Thimphu as present city of Thimphu may not have much scope of expansion.

⁴⁰ Thimphu Road Improvement Plan, ADB, KPMG analysis

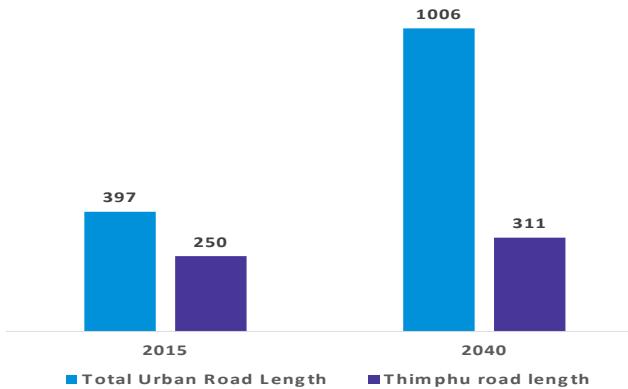


Figure 35: Projected requirement of urban road network

Source: KPMG Analysis

- Public transport requirement by 2040

Public transport requirement can be projected based on the future urban population. Since population as well as size of urban centers in Bhutan are expected to be relatively small compared to urban centres/ cities in other Asian countries such as India, Bangladesh, Thailand etc, hence bus based public transport service shall be an optimal solution to cater to transportation requirements of urban centers. As per the best practices studied in various cities, it is suggested that 60 buses against 100,000 city population⁴¹ is required. Based on this metric, Bhutan presently requires 184 buses against which it has only 58 buses operating in the urban area. By 2040, this requirement will rise to around 475 buses.

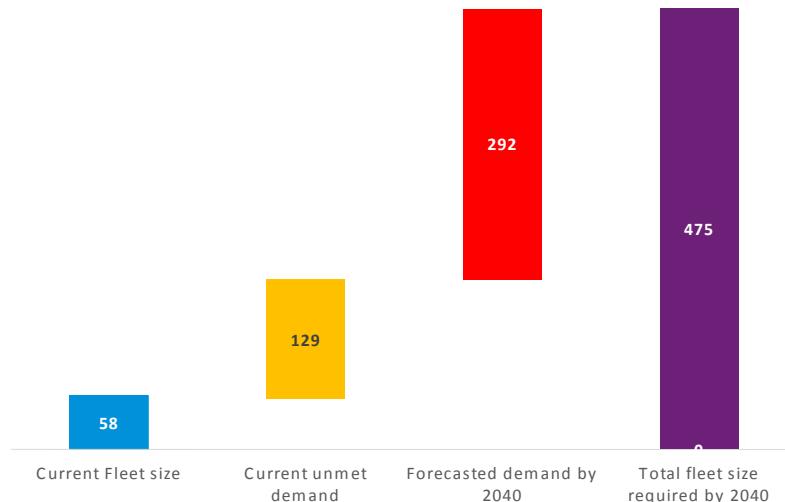


Figure 36: City bus fleet size analysis, 2040

Source: KPMG Analysis

⁴¹ Toolkit for Public-Private Partnerships in Urban Bus Transport for the state of Maharashtra, India, Knowledge series, The GOI-ADB Initiative

Similarly, Thimphu's current requirement is 76 buses out of which it has a fleet of 54 buses i.e shortfall of 22 buses. By 2040, this requirement is expected to reach 205 buses.

The P/ling structure plan 2013 suggests that around 57,416 population can be accommodated, thus requiring close to 34 buses to cater to this population i.e. 30 more buses shall be required by 2040.

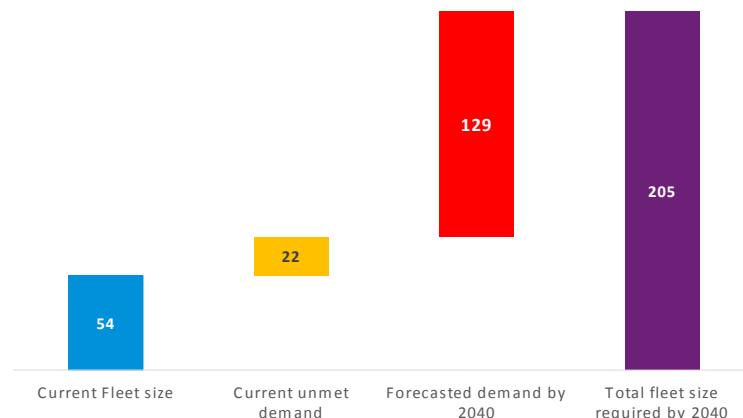


Figure 37: City bus fleet size analysis for Thimphu, 2040
Source: KPMG analysis

As a standard practice, for every 70 incremental buses, there is requirement of 1 depot⁴². Hence, based on bus requirement projected upto 2040, total 7 depots shall be required in Bhutan. Moreover staff @ 5.3 per bus⁴³, 1087 staff shall be required to operate 205 buses. Based on the bus routes, requisite amount of bus terminals also need to be in place.

- Investment requirement by 2040

By 2040, there is substantial requirement in terms of infrastructure as well as services to cater to growing urbanization.

Urban Transport Component	Quantity required	Investment required (Nu)	Basis
Urban roads	609 Kms	36,540	Nu 60 mn/km
Buses	475#	3,050	Nu 6 mn/bus
Depots	7#	700	Nu 100 mn/Depot
Total		40,240	

Table 12: Investment requirement by 2040
Source: Report on Indian Urban Infrastructure and services, HPEC 2011 and KPMG Analysis

⁴² Report on Indian Urban Infrastructure and Services, The High Powered Expert Committee (HPEC) for estimating the investment requirements for Urban Infrastructure Services, 2011

⁴³Source: <http://morth.nic.in/showfile.asp?lid=2025>

Based on major investment components i.e. roads, buses and depot and their projected demand, an investment of Nu 40240 million by 2040 shall be required to be made by the RGOb in these components to adequately meet urban population demand.

4.3 Challenges in Bhutan's urban transport

- Traffic congestion

As explained in the initial section of this chapter, there has been an unprecedented growth in the levels of motorization in Bhutan. The increase in vehicle has been mainly concentrated in private car category indicating dominance of motorized personal transport.

Country developed	Per 1000 Persons	
	Passenger cars	Total vehicles
US	439	828
UK	460	544
Japan	617	617
Germany	510	610
Australia	550	717
France	496	654
Mexico	191	288
Malaysia	313	675
Brazil	165	275
China	34	119
South Korea	267	393
Bhutan	108	73

Table 13: Vehicular penetration in select developed and developing countries

Source: National Transport Development Policy Committee, 2013

As of 2016, total motor vehicle registered per 1000 population as well as passenger vehicle registered per 1000 population in Bhutan is 108 and 73 respectively. This is equivalent to China even with Bhutan being a lower per capita income country. Further, as indicated earlier the vehicle ownership trend is lopsided towards western Bhutan mainly Thimphu and P/ling when compared to other urban centers.

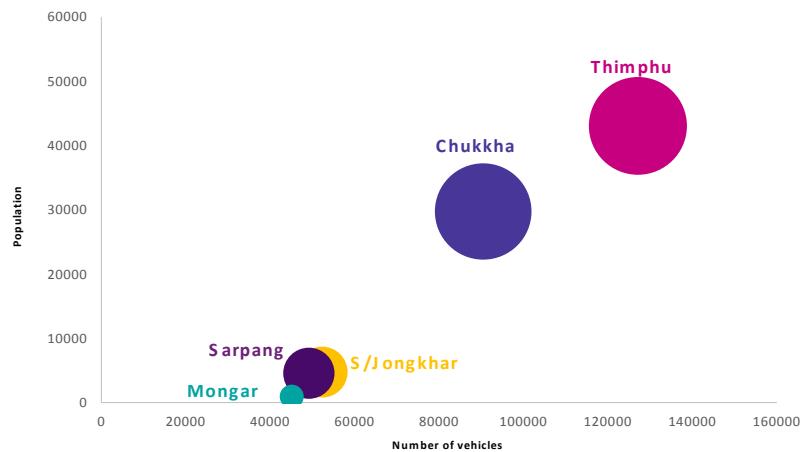
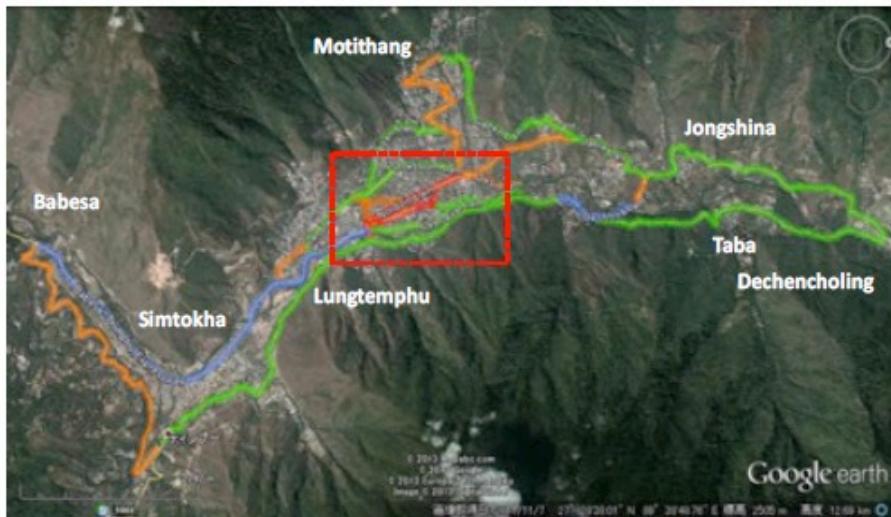


Figure 38: Vehicle per 1000 population in Bhutan

Source: RSTA, NASB

The passenger vehicles per 1000 population metric for Thimphu and Chhukha (most urbanized regions) is 234 and 227 which is quite high compared cities having larger area, better road infrastructure as well as higher population. This high density is further evident through heavy traffic congestion in Thimphu and Phuentsholing in Chhukha.

The figure below illustrates travel speed in peak hours on the major roads, based on data and speed survey undertaken by JICA team. This data takes into account stoppage time, thus represents the degrees of congestion. Congestion is primarily observed in the core city areas. Two streets namely Norzin Lam and Chang Lam are busiest streets of city center in terms of vehicular movement throughout the day. Some sections in the outskirt are shown in orange, because those roads run over steep terrains and have winding alignments.



(a) All area

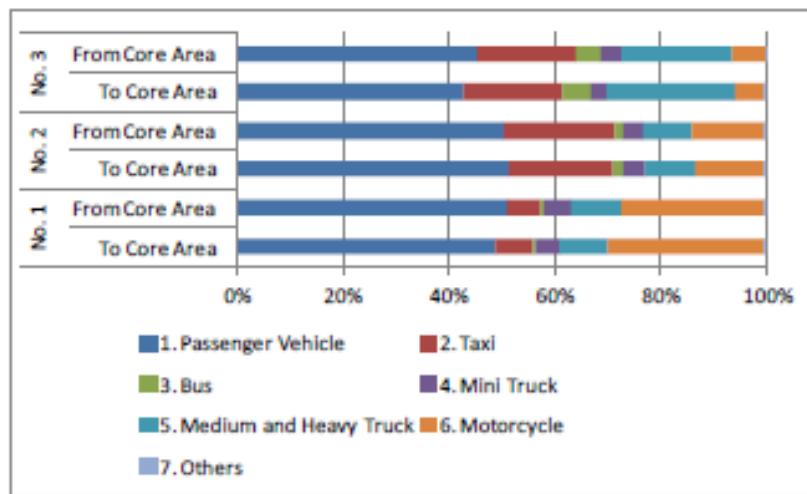


(b) Core area

Legend: red = less than 20km/h, orange = less than 30km/h, green = less than 40km/h, blue = more than 40km/h

Figure 39: Peak hour travel speed on major roads

Source: Data collection survey on Urban Development and Environment in the Kingdom of Bhutan, JICA, 2014

*Figure 40: Traffic Movement in Phuentsholing*

Source: JICA

Traffic congestion in Phuentsholing is on account of high volume of private modes of transport and taxis which typically constitute approximately 60% of all vehicles and freight vehicles (mini trucks and trucks) constituting 15-25% of vehicles. Freight vehicles movement from border area within the city as well as their inter-mixing with normal traffic is also a reason for congestion. Phuentsholing is the busiest border crossing point (BCP) in terms of freight vehicle traffic as well as tourist vehicles arriving from India. The main challenge faced by Phuentsholing urban center is the improper layout of trade clearance, transport facilities as well as road infrastructure. The figure below exemplifies how freight vehicles move around the city to access weighbridge, truck terminals, custom offices, workshop etc. Ideally all of the facilities could be co-located to prevent unnecessary movement of freight vehicles within city area.

*Figure 41: Freight vehicle movement in Phuentsholing*

Source: Data collection survey on Urban Development and Environment in the Kingdom of Bhutan, JICA, 2014

Though, the enormity of the traffic congestion problem is not huge when compared with that experienced in mega-cities such as Mumbai, Delhi or Beijing; the issue has potential to assume greater magnitude if not targeted through mitigating actions in these urban centers as well as preventive actions in other urban centers of Bhutan.

- Low usage of bus transport service

Another challenge for the government is the low usage of public bus transport. The city bus service currently has insufficient capacity to meet ridership demand during peak hours thus forcing potential customers to use taxis or private mode of transit. Total 36,000 trips per day in Thimphu are being made by use of public transport out of which the city bus account only for 6% share whereas remaining 30% is being handled through private taxis⁴⁴. Recently, the city bus service has augmented its fleet by 16 buses in Thimphu and 2 buses in P/ling. This is expected to augment capacity as well as improve frequency and service reliability. The new buses are modern with ramps for disabled to climb up the bus, passenger information systems installed on board, reserved seating for women, disabled, monks and senior citizens, surveillance systems etc. Even with this addition however, the fleet size is inadequate when compared with standard practice of having 60 buses per 100,000 population⁴⁵.

A comparison has been drawn between Thimphu and Shimla, a hill town in India having similar geography, area and population base. The table below shows the extensive fleet of buses operating in Shimla and a significantly high operational utilization, in comparison to Thimphu.

City	Shimla	Thimphu
Population (in Millions)	0.17	0.12
Fleet held	169	58
Total routes	245	12
Vehicle Utilization (Km/bus/day)	98	46
Revenue (Rs/Km)	36.0	15.0*
Expenditure (Rs/Km)	53.3	30.0*

Table 14: Snapshot of comparison of city bus service in Shimla, India and Thimphu, Bhutan

Source: City bus service, KPMG Analysis

*considering 330 days per year of operation

There are other reasons for low usage of public bus transport. The World Bank recently conducted a survey amongst 1,000 households to gauge their transport preferences and travel behaviors in Thimphu. Approximately 30% of non-bus users reported that long and irregular waiting times for buses was the primary reason for their choice of alternative modes⁴⁶. The city bus service doesn't have dedicated access points other than signages. Further, the bus stop infrastructure lacks proper shelter, seating area, bus parking bay to take in passengers from stop. They are also not integrated with pavements and footpath

⁴⁴ Project/Programme Concept Note, Green Climate Fund, 2015

⁴⁵ City bus service development toolkit, ADB

⁴⁶ World Bank Survey, 2013

network resulting in accessibility issues. Limited passenger information on bus routes, timetables and interchanges also impede the ability of passenger to plan trip as well as estimate waiting times leading to people opting for taxis and private cars. 77% of regular taxi users who responded to the World Bank's household survey on travel behaviors cited that the primary reason that they use taxis is because they are "quick and convenient". Another indicator of poor user experience is the age of the fleet. As a best practice, the average fleet age should not be more than 4 years to enable the bus service carry out operations efficiently, without breakdowns and better fuel efficiency. The average age of city bus service is however 7+ years even after factoring the new bus addition. Almost 59% of fleet age is more than desired 4 years age. Further, bus quality, cramped internal conditions are also a major concern and require modernization.

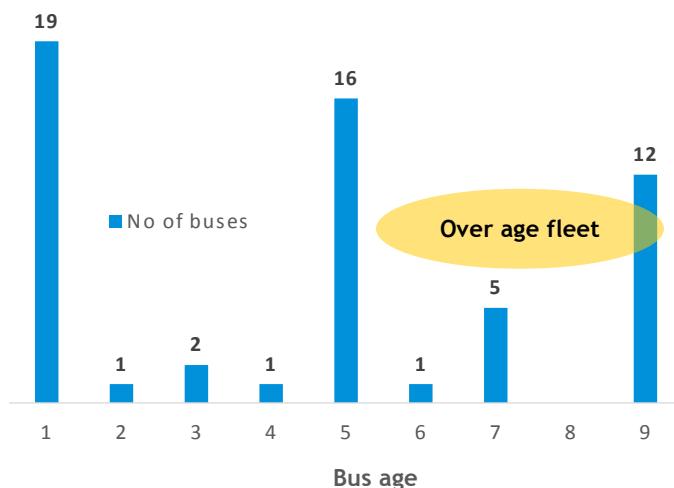


Figure 42: Fleet age of city bus service at Thimphu

Source: Annual Infocomm & Transport Statistical Bulletin, 7th Edition, 2016

*includes age of private bus fleet as well as Phuentsholing Fleet

It is imperative for Bhutan to systematically improve the service delivery levels of bus transport in its urban centres. This will not only resolve the congestion issue but will also reduce the vehicular pollution by reduction in personal vehicle usage.

- Inadequate parking spaces as well as parking controls

The parking requirement is a concern mainly in Thimphu and P/lng on account of high number of motor vehicles present in the cities. Thimphu center was formed before motorization happened and thus has not been planned with provisions for adequate parking to accommodate growing number of motor vehicles. On account of parking being in short supply, the parking in city center is almost fully occupied throughout the daytime. Further, the city center is quite congested and has no room for developing additional parking. Even off-street parking slots have been provisioned to the maximum extent possible. Further, on-street parking in already narrow at Norzin Lam and Chang Lam leads to slower movement of traffic and thus leading to congestion. In order to undertake best utilization of space within city center, Thimphu Thromde has been developing two multi-level car parks on PPP basis. The MLCP will have space to park 500 cars. It is planned to do away

with on-street parking in city center after MLCP is fully functional. This is expected to ease traffic in city center as more road space shall be made available for traffic movement.

Phuentsholing also experiences congestion but on account of different reasons, the parking problems are evident there too as parking spaces have not been planned well. Phuentsholing structural plan which is currently being drafted; plans to address this issue.

However, as per international experience it has been proven that increased supply of parking results in increased traffic in the area and thus parking provisions are never enough. On the contrary they promote private vehicle usage. The parking management is a land use lever utilized as a component of sustainable transport policy by developed countries. The underlying philosophy is to provide for parking while undertaking city planning but keeping in mind that the land is scarce resource and should be made expensive enough to discourage personal vehicle usage in urban centers.

- Improper integration of transport plan with city land use plan as well as its implementation

The absence of integrated transport planning and land use planning can be exemplified through Thimphu. TSP 2004 proposed a road hierarchical network within its urban area. However, some sections of primary road (18 m width) planned in central region of the city are still undeveloped. This is on account of construction of buildings along the planned road in the area leading inadequate right of way in such areas. It has resulted into narrow roads in high traffic density area causing frequent traffic congestion during peak hours.

Similarly, an urban corridor with bridges had been planned as per TSP 2004 in northern part of Thimphu to bring about orderly development but in absence of the same this has resulted in high concentration of growth in southern region spilling over the restricted areas as well as occupying agricultural land outside Thimphu Thromde boundary.

Also, a 6 km expressway has been constructed in south with divides southern part in equal halves mainly to connect south of Thimphu to city's core. However, road crossings as well as flyovers connecting two regions are not planned leading to longer length to be travelled, increased use of motor vehicles, detours and higher travel time for residents.

Similarly in Phuentsholing which is a border crossing point does not have an integrated trade clearance and transport infrastructure layout. This leads to freight vehicles mixing with city traffic and causing congestion, damaging city infrastructure and increasing vehicular emissions.

Rapid urbanization in absence of adequate city growth vision as well mobility plan can result into haphazard growth of urban centers without adequate provision of transport and thus increased use of private vehicles, traffic congestion and other urban transport issues.

- Inadequate capacity with respect to traffic planning as well as urban transport planning
- The ITS feasibility study as well as Action plan, 2015 has identified a capacity gap within Thromde to address traffic congestion as well as urban transport related issues. While Bhutan is urbanizing at an unprecedented rate, the capacity to anticipate as well as

resolve urban transport related issues also requires to be developed. At present Bhutan does not have any traffic engineers and urban transport planners working in public sector and hence there is dependency on external consultants for drawing expertise for the same.

- Inadequate regulation of urban transport

Regulations affecting urban transport are grossly inadequate and this is reflected in a number of issues. Few indicators are cited below.

a. Private city bus operators

RSTA is responsible for issuing permits as well as regulating private bus services within Thromde. The service levels of private operators are either not specified explicitly by RSTA or are not enforced effectively. The private players are not mandated to provide obligatory service over non-profitable routes along with profitable routes. Further, the players do not operate on Sundays as well as public holidays owing to low ridership, hence putting more pressure on finances of state run city bus service whose financial condition is already stressed.

b. Taxi operators

Taxi is important mode of transit within Thimphu and Phuentsholing. The taxi fare though regulated and fixed by RSTA, are not being enforced properly and drivers tend to overcharge.

c. Automobile Workshops

As indicated during primary consultations, with increased vehicle ownership levels, automobile workshops have also proliferated for repair and maintenance of automobile vehicles. Most of them are currently situated on outer periphery of the urban centres. The operations of the automobile workshop have resulted in degradation of land and water resources. There is an urgent need for regulation of such activities. As of now there is no regulation or agency designated to regulate activities of automobile workshops.

4.4 Policy interventions required

Globally, the public officials, advisors, practitioners and experts have been shifted their focus from conventional transport planning to sustainable transportation planning as it balances economic, social and environmental objectives. For example a conventional planning overlooks the parking cost savings, trade deficit reductions, improved mobility for non-drivers, public fitness and health benefits that result when travelers shift from automobile to more efficient modes. A sustainable transport planning on other hand applies comprehensive analysis and integrated planning which co-ordinates decision making between different jurisdictions, sectors and groups. This approach identifies win-win solutions, that is, strategies that provide multiple benefits. For example, the pollution reduction strategies that also help reduce traffic congestion and accidents. The sustainable transportation planning involves a standard approach within “Avoid-Shift-Improve” framework.

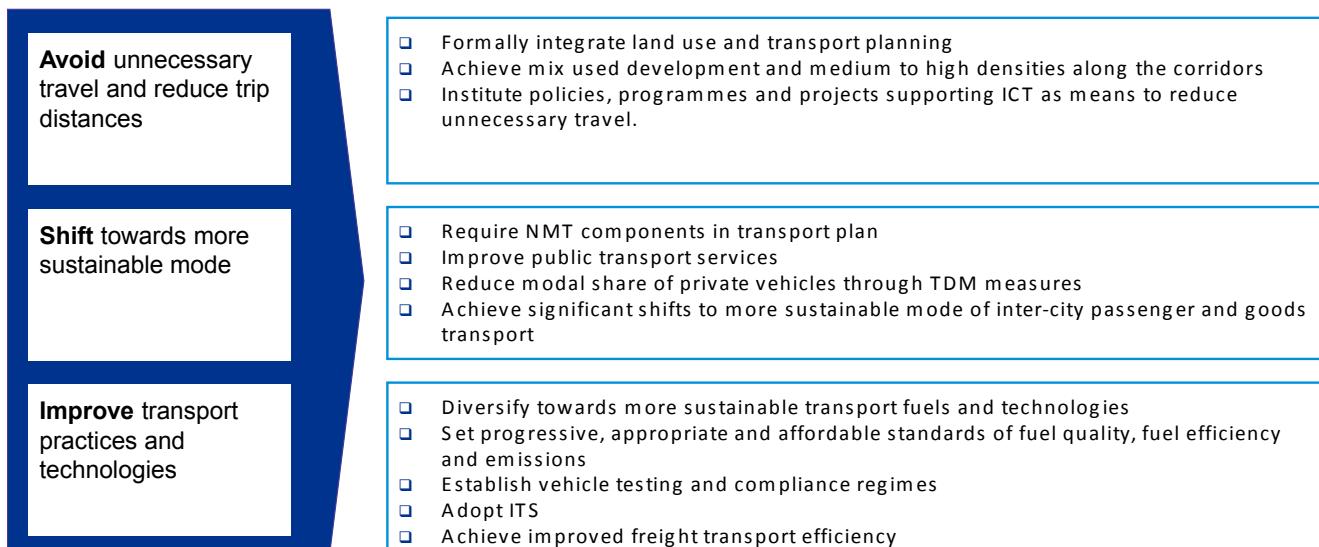


Figure 43: Avoid-Shift-Improve framework for sustainable transportation planning

1. Avoid

The Avoid component consists of avoiding unnecessary travel as well as reducing trip lengths. This is typically done by formally integrating land use and transport planning such that mixed use development is promoted, leading to co-location of basic civic amenities and commercial centers within the locality. Urban transport is a derived demand closely linked to urban growth policies. Integrated transport and mixed land use planning shall result in reducing the trip distance by motorized transport and making it feasible to be accessed through alternate modes of transport. The order of planning is such that priority is accorded to non-motorized transport followed by public transport and other motorized transport.

The table below presents a desirable modal mix for various sizes of cities. Since Thimphu, Bhutan's largest urban agglomeration, is projected to reach 200,000 by year 2040, the table shows the desired modal mix of two categories of urban centres i.e. 0.05 - 0.1 mn and 0.1 - 0.5 mn.

Type of transport mode	Population between 0.05 - 0.1 mn	Population between 0.1 - 0.5 mn
Walk	30	30
Cycle	25	20
Rickshaw	12	10
Public transport	20	18
Private motorized cars	1	1
Private Two-wheelers	12	21
Total	100%	100%

Table 15: Desirable modal share for different sizes of urban centres

Source: NTDPC report

* From the above table, it can be concluded that urban centres in Bhutan should typically target nearly 60-65% of their overall transport mode to be non-motorized. Public transport should be at least 20% while private motorized transport should not be more than 20% for Thimphu and around 10-12% for smaller urban centres.

Walking and cycling are inexpensive and emission-free modes of transport and also offer health benefits. Walking particularly is not just a mode of transportation but very important from social life of a city as it reduces the safety risks. Therefore to achieve a sustainable transport policy, non-motorized transport in urban centres needs to be necessarily promoted. This would involve creation of infrastructure that facilitates safe and convenient walking or cycling. The Eleventh Five Year Plan (2013-2018) also proposes construction of bicycle lanes and pedestrian walkways in Thimphu and Pheuntsholing. Cities like New York, Washington and Columbia have enacted legislations for streets and sidewalks. Columbia's Sidewalk Assurance Act for instance provides for mandatory installation of sidewalks on all streets to enable not just a safe environment for pedestrians but also making it inclusive for persons with disabilities.

Apart from integrated land use and transport planning, Bhutan should also promote transit oriented development over key transit corridors in urban centres of Bhutan especially in Thimphu. Many cities across the world are promoting higher intensity of urban development along transit corridors as it provides citizens with a better access to public transport. A case study of an efficient use of TOD in Curitiba, Brazil is presented below.

Case Study: Transit Oriented Development with BRT as efficient mode of public transport in Curitiba, Brazil

The Curitiba in Brazil provides a classic case of transit oriented development, integrated land use planning and promotion of NMT. It provides integration of sustainable transport considerations into business, road infrastructure and local community development.

Curitiba provides a model to integrate sustainable transport considerations into business, road infra and local community development. The plan envisaged growth on two north –south arteries and encourage commercial and service sector growth

- Curitiba's master plan established that mobility and land use plan cannot be disassociated with each other and thus main arteries of cities were modified over time to give public transport a highest priority.
- Separating the traffic types and establishing exclusive bus lanes on the city's main arteries helped to achieve two defining characteristics :
 - A safe, reliable and efficient bus service operating without hazards and delays inherent to mixed traffic bus service;
 - Densification of development along the bus routes.
- About 2000 buses make 12,500 trips per day serving 2.1 million passengers of the city. Curitiba's buses are privately owned by ten companies and managed by a quasi-public company.
- The city has around 200 km of cycling track following river bottom valleys and connecting various city districts making city accessible on bicycle.



The master plan of the city associated equal importance to mobility as it is to land use planning. Further, mobility planning involved separating traffic types and establishing exclusive bus lanes on city's main arteries.

- The modal share of Curitiba is 23% private vehicles, 5% motor bikes, 5% bicycle, 21% pedestrians and 45% BRT. The BRT is used by 85% of Curitiba's population.
- Mass public transport has resulted in reduction of 27 million trips by car in a year and reduction in number of cars on road by 25% though per capita ownership of cars in Curitiba is higher than national average.
- Curitiba is regarded as excellent example of Transit Oriented Development which implies residential, business and recreational areas should be built in high density areas and close to public transport.
- By coupling development of pedestrian friendly community with an efficient BRT, lower car parking availability, Curitiba has reduced the overall travel of residents



Figure 44: Case study-Transit Oriented Development and Integrated Land use planning in Curitiba, Brazil
Source: Curitiba, a model of transit oriented development www.ecomobility.org

Public transport account for as high as 45% of trips within city and utilized by 85% of city's population. The transit oriented model employs residential, business and recreational areas to be built in high density areas and close to public transport corridors. Further, the development was supported by establishing pedestrian friendly measures, efficient BRT and lower car parking availability. The TOD based approach as resulted into lowering of overall travel requirements of residents. It was estimated at close 27 million trips per year by car have been reduced on account of BRT systems and a reduction of 25% of cars on road even though Curitiba has higher number cars than national average in Brazil.

2. Shift

The “Shift” strategy requires shifting the citizen preference from use of personal mode of transport to public as well as other sustainable mode of transport. This can be done by the following:

- **Development of Efficient Public Transport**
- **Undertake improvement of city bus service**

City bus service requires improvement on two fronts: Operational as well as Infrastructure. Operational improvements include augmenting capacity by purchasing additional fleets as well as modernizing fleet, improving reliability, as well as operational efficiency through better operations management and providing traffic priority over other modes to improve speeds. Infrastructure improvements include development of critical bus stop infrastructure to provide for waiting areas, shelters, electrification consisting of lighting, passenger information systems as well as surveillance systems. Others measures that can be undertaken include promoting use of city bus transport by making people aware of benefits as well as changing perception about public transport and introducing city bus services in other growing urban centers. With regards to urban public transport, Bhutan needs to set the minimum service standards that they target to achieve. The mode of delivering such service could be either through an existing model where public sector (Bhutan Post) and private sector players get collectively engaged in operations. It could also be where public authorities limit their role in only route planning, fare fixation, etc and get the operations delivered through only private sector participation. Various models of private sector participation exist in bus services, some of them running very successfully. One such case study of development of efficient public bus transport system in Indore city of India is presented below.

City bus service in Indore – a Case study

Indore hardly had any public transportation system until few years ago. A special purpose vehicle ICTSL was set up by Indore Municipal Corporation and Indore Development Authority to operate and manage the public transport system through PPP. Common unbundling features in developing city bus services were

- A transparent and competitive bidding process for service providers
- Private bus operators running the services on route determined by ULB
- Road network, common parking places, maintenance workshop and bus stops to be provided by ICTSL
- All advertisement rights to be sold to one private operator
- Ticketing and marketing to be managed by another private party
- GPS and PIS to be provided by private party
- ICTSL facilitated in purchase of buses through counter guarantees to banks
- ICTSL regulated fares, operations as well as carried out contract monitoring

The idea of unbundling was to share risks, promote competition and to take advantage of any economies of scale. The bidding was done based on premium received per bus per route per month for operation rights. Daily fare box revenue to be retained 100% by operator, monthly pass revenue to be shared in ration of 20:80 between ICTSL and Operators. Pass vendors to receive a share for making, distributing and marketing of passes. Advertisement revenue to be distributed in 40:60 proportion between ICTSL and Private party. The net profits of ICTSL has gone up from Nu 3.4 million in 2006-07 to Nu 10 million in 2009-10. The company has grown rapidly without any investment and has been able to make healthy profits from second year of operation. Even number of accidents have also come down with scaling up of city bus services and ridership has boosted from 0.6 million in 2006 to 2.6 million in 2008.

Figure 45: City bus service in Indore - a Case Study

Source: Minimum Investment with Maximum return: A case of Indore city transport service, G Raghuram, Satyam Shivam Sundaram, IIM Ahmedabad

The government should explore the avenue of bus operations through public private partnership mechanism. There are 2 models of contracting that are prevalent across the world:

1. Gross cost contract: wherein the government/concessioning authority plans the bus routes, sets the time table, lays down minimum service level standards in terms of minimum number of kms to be operated, bus frequency etc and pays the private operator an agreed amount/km operated. The rolling stock and the drivers are provided may/may not be by the private operator. The fare collection responsibility lies with the concessioning authority. Under this arrangement, the entire revenue/passenger ridership risk is assumed by the concessioning authority.
2. Net Cost Contract: wherein the government/concessioning authority plans the bus routes, sets the time table, lays down minimum service level standards in terms of minimum number of kms to be operated, bus frequency etc and either pays to or receives from the private operator an agreed amount/bus/ month. The rolling stock and the drivers may/may not be provided by the private operator. The fare collection responsibility lies with the private operator. Under this arrangement, the entire revenue/passenger ridership risk is assumed by the private operator.

The government considering the pros and cons of the 2 mechanisms may opt for the most suitable mechanism.

- Development of Bus Rapid Transit (BRT) system in Thimphu

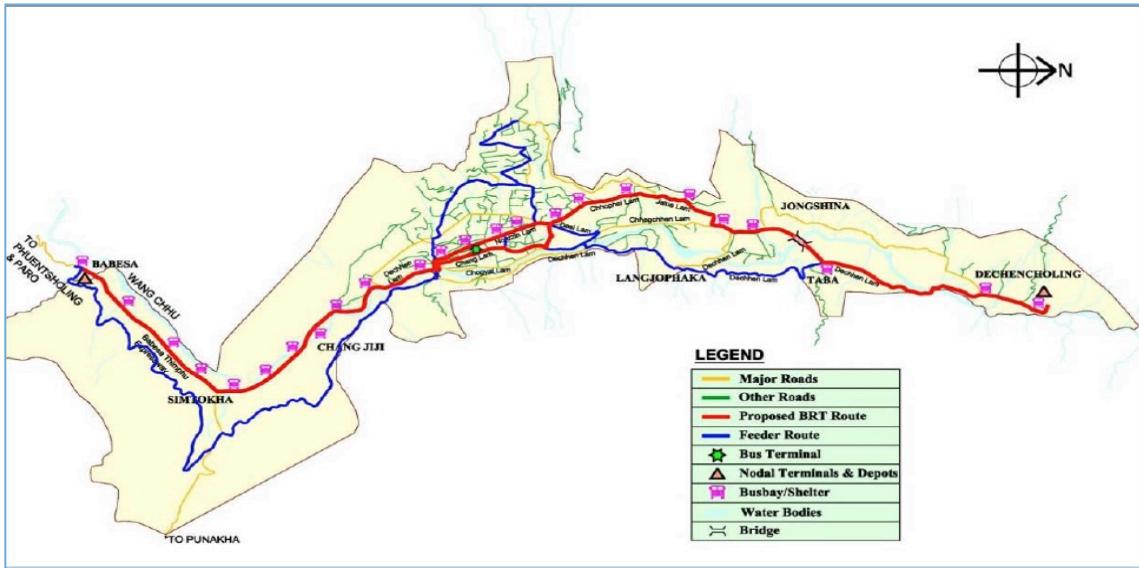


Figure 46: Proposed BRT route as well as secondary routes for feeder services

Source: Bhutan Urban Transport Study, IFC

Public transport can become more efficient by way of introduction of bus priority ways, BRT in development and expansion of urban cities. RGOB has also undertaken a feasibility study with respect to development of Bus Rapid Transit system on main North South corridor of the city owing the linear structure of city. The study established the economic feasibility of such a system and suggested that it can be developed on PPP basis. The plan suggests BRT on trunk route and feeder services to feed passengers from surrounding areas to the BRT route.

. Based on traffic surveys conducted by JICA, the bus transport is the optimal and best solution for Thimphu and for other urban centers. It is understood that Green Climate Fund is available for development of BRT civil works combined with the NMT elements as well as for procurement of low emission buses for Thimphu.

- **Transport Demand Management**

Traffic congestion is the key issue faced by globally and urban authorities are struggling to resolve the same as it affects

- Efficient movement of people and freight
 - Wastes time and energy
 - Causes pollution and stress
 - Decreases productivity
 - Impose costs

There are multiple causes of traffic congestion which can be categorized as below given macro and micro-level causes. Macro causes involve changing income levels resulting in

higher car ownership, regional economic dynamics, employment patterns, etc while micro-level causes could be multiple people travelling in the same direction at the same time, too many vehicles on limited road space and other factors such as delay on account of accidents, vehicle breakdown, poorly timed signals, improper traffic management.

Globally, to address traffic congestion, city authorities have been adopting various measures. The measures adopted can predominantly be divided into two main categories i.e. supply side and demand side measures. Supply side measures consist mainly of improving or augmenting transport infrastructure, tolling of roads as well as traffic management measures. The demand side measures include increasing relative cost of travel against public transport, availability of alternative means of transport, parking supply etc.

Below mentioned are specific transport demand management measures which have been adopted in other countries. Bhutan has also adopted few of the below given measures.

Type of Incentive/Disincentive	Possible Economic Instruments	Economic Measures
Curb motorized vehicle ownership	Tax/ charge on vehicle purchase/ ownership/ scrappage	Annual Vehicle tax Registration tax/ charge Sales tax/ charge Scrappage tax/ charge
	Restricting the number of vehicles and/ or new registration	Auction schemes/ competitive bidding for new licenses Licensing car ownership
Discourage motorized vehicle use and encourage switch to public or non-motorized transport	Tax/ charge on vehicle use	Fuel tax Pay at the pump surcharges
	Tax/ charge on road and/ or infrastructure usage Restricting access to urban centres or special area	Parking fees City tolls Road pricing Bridge tolls Cordon/ area pricing Congestion pricing
	Subsidies for public transport and/ or multi-modal transport (modal subsidies)	Subsidized public transport fees Subsidies for public transport network and operation Tax-deductible public transport expenses
Encourage lower emission technology use and innovation	Taxes/ charges on vehicle purchase/ ownership/ scrappage Taxes/ charges on vehicle use Taxes/ charges on road and/or infrastructure usage	Tax differentiations based on emissions Carbon/ energy taxes Emission fees Emission based charges Subsidies, tax rebates for lower emission vehicle/ technologies
Minimize need for travel and reduction of congestion	Telecommuting Work from home Staggered working hours Differential pricing	Higher fares in public/mass transit modes in peak hours and lower fares in off peak hours Different toll rates for peak and off

Type of Incentive/Disincentive	Possible Economic Instruments	Economic Measures
		peak hours

Table 16: Transport Demand Management measures

Source: NTDPC report, KPMG Analysis

Parking management as a tool

Land is valuable in all urban areas. Parking places occupy a large part of such land. This should be recognised in determining the principle of parking space. Levy high parking fee that represents value of land occupied. This should be used as a means to make use of public transport and make it more attractive. Graded parking fee should recover the cost of the land.

Public transport vehicles and non-motorised modes of transport should be given preference in the parking space allocation. This along with easier access of work places to and from such parking spaces, can encourage the use of sustainable transport.

Park and ride facilities for bicycle users with convenient interchange are a useful measure. In residential areas also, byelaws can be changed to free the public carriageway from parked vehicles impeding the smooth flow of traffic. Bhutan can make provisions in the appropriate legislation to prevent the use of right of way on road systems for parking purposes.

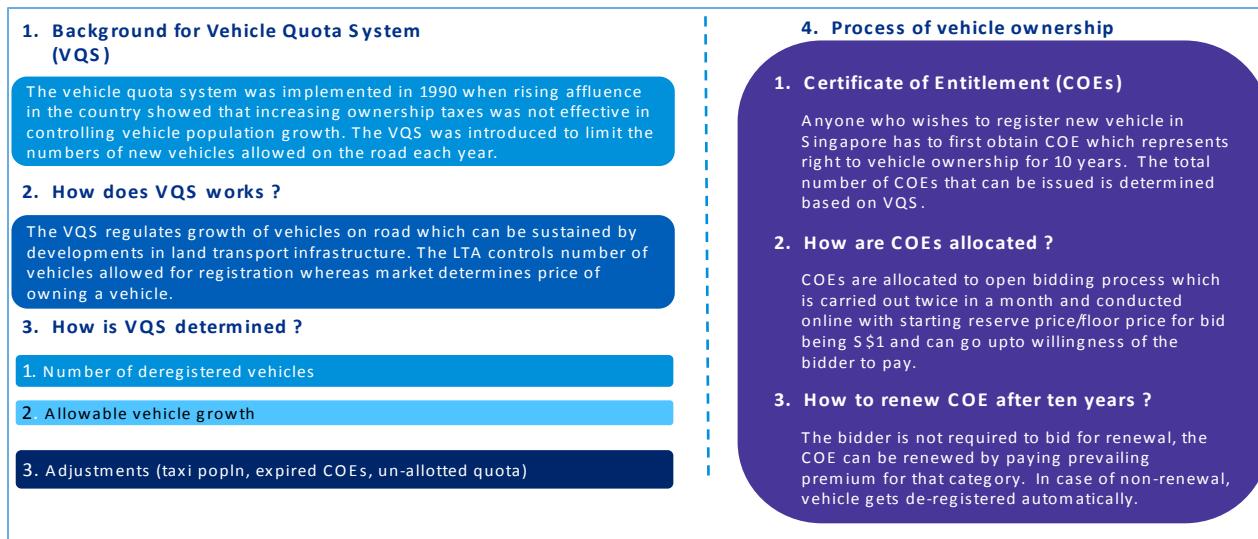
Other congestion management tools

Select case studies have been studied for better understanding of various measures adopted to resolve traffic congestion in various countries. Some of practices studied are

- Vehicle ownership regulation using quotas in Singapore
- Congestion charging for entering a designated area in city in Sweden
- Traffic demand management measures using parking controls, electronic road pricing as well as restriction of vehicle usage in certain areas of city as used in Beijing.

Case Study 1: Vehicle ownership regulation through quota bidding in Singapore

Singapore Land Transport Authority (LTA) discourages vehicle ownership through a system of certificate of entitlement which is mandatory for any citizen to own or purchase a vehicle. The Quota numbers are arrived based on vehicles getting de-registered every year, allowable vehicle growth in terms of expansion in supply side infrastructure within country as well as applying adjustments such as taxi population, expired CoEs and unallotted quotas (not bidden out)

*Figure 47 : Case Study- Demand side measures to address traffic congestion in Singapore*Source: www.lta.gov.sg, KPMG Analysis

The COEs are allocated based on open bidding process which is carried out twice a month and being decided based on premiums quoted by potential bidders. Thus, Land Transport Authority controls the number of vehicles allowed for registration whereas market determines the price of owning a vehicle. Even renewal of COEs require paying ongoing premiums.

Categories of Quota	Quota	Quota Premium	Total Bids Received	Number of Successful Bids	Unused Quota carried forward
Category A (Cars up to 1600cc & 97kW (130bhp))	1846	\$50,889	2,437	1,766	80
Category B (Cars above 1600cc or 97kW (130bhp))	1246	\$52,807	1,967	1,226	20
Category D (Motorcycles)	377	\$6,052	412	331	46
Category C (Goods vehicles and buses)	186	\$47,001	254	173	13
Category E (Open)	400	\$52,600	662	381	19

*Figure 48: Snapshot of VQS bidding systems and premium quoted for Vehicle quota under each category*Source: www.lta.gov.sg

With regulation of vehicle ownership, the year on year growth in vehicles have reduced from 3% annually to 0.25% annually by 2016. Similar controls can be extended in case of Bhutan by restricting ownership of second vehicle per household i.e. more than one motor vehicle per household.

Case Study 2: Transport demand management through congestion charging in Sweden

In order to reduce congestion and vehicle emissions in inner city area of Stockholm, a city cordon area was established and controlling systems were deployed on various entry exit routes of the designated area/city center.

1. Purpose		4. Project Characteristics	
The project aimed at reducing congestion and vehicle emissions in inner city area of Stockholm. The project objectives were reducing congestion, improving access and mobility, promoting transit and environment sustainability.		Stockholm Congestion Tax	
2. Concept		Purpose	
It involves charging a variable tax for crossing cordon drawn around Stockholm City Center area. Vehicles registered are charged whenever they cross any one of designated 18 control points.		Application	
3. Implementation		Fee structure	
It was implemented as a 7 month demonstration after which the system was turned off and subjected to public referendum. The residents chose to continue with this system in majority.		Use of revenues	
		Technology	
		Milestones	
		Managing Authority	
		Other Highlights	
		Results	

Figure 49: Case study- Congestion charging in Stockholm, Sweden

Source: Reducing road congestion and funding transportation using road pricing in Europe and Singapore, 2010, US Department of Transport

A system of charging variable tax on crossing a cordon drawn across Stockholm city center on entry and exit of vehicles based on time of the day was established and necessary infrastructure was set-up. The programme was implemented as a 7 month demonstration and was turned off. However, the residents voted unanimously to continue with this system after witnessing potential benefits. The system resulted into 20% reduction in vehicular traffic, 10-14% reduction in emissions and 2-10% improvement in air quality.

Additional measures adopted⁴⁷

- Tokyo mandatorily requires motorists to demonstrate the evidence of owing an off-street parking space in order to register a vehicle in the city. The measure reduces on-street parking problem and has also resulted in reduction of per capita car ownership.
- Motorists in Singapore are charged for driving on major road network using Electronic Road Pricing (ERP) system. The cars are equipped with In-Vehicle Unit which automatically deducts fee when vehicle passes under the gantry.
- Beijing since 2008 prohibits vehicles from driving on public roads one day in a week based on license number plate. Further, since 2009 it prohibits vehicles which have not passed emission tests from driving within city centre.

Traffic congestion is an issue faced by cities of Thimphu and Phuentsholing. Since both these cities in Bhutan have very limited space for road network expansion on account of

⁴⁷ Bangkok 2020 Declaration Evaluation Review, May 2016

terrain, the demand side measures are required to be in place to control vehicle usage instead of supply side measures. Whereas, for other urban centers, the vehicular growth as well as potential traffic problems can be addressed through mix of supply and demand side measures. Certain tools such as vehicle quota may face enforcement challenges as vehicles can be registered in one region and are free to ply in other region. Similarly, RSTA has introduced taxi cap and disallows any new taxi registration. However, taxi comprises of only 4% of total number of vehicle registered with cars being 64%. Further, this is the segment which is growing at increasing rate and requires to be controlled. The taxi cap on standalone basis might not be effective and may not yield desired results.

3. Improve

- **Cleaner Fuel and Technologies**

A policy cannot be categorized as “sustainable” unless adequate attention is paid towards energy efficient and climate resilient measures. One such measure is promotion of cleaner fuel and energy efficient in urban transport. Promotion of electric vehicles and other fuel efficient technologies by way of fiscal incentives/ support can result into reducing vehicular emission as well as reduced fuel imports. Various technologies such as hybrid as well as cleaner fuel such as gas based fuel, bio-diesel etc requires to be explored. Bhutan has already resolved to enhance the use of cleaner fuel and systematically reduce the dependency on conventional fuels. Towards this, various measures have already been taken and should be continued with a greater resolve and focus.

- **Formulation of Standards**

Another measure involves promoting efficient vehicles on road based on enforcement of strict vehicle emission as well as fuel quality standards. This would discourage use of inefficient technologies as well as older vehicles. Details have already been discussed in Chapter 3 policy interventions section.

- **Inspection and Maintenance**

Regulation of vehicles usage through stringent enforcement of standards such as emission, age, fuel, maintenance, safety should be carried out to reduce keep unfit vehicle off the road, increase cost of ownership of vehicles and improve safety. This is very much required to be undertaken across Bhutan and not just urban centres alone. Details have already been discussed in Chapter 3 policy interventions section.

- **Intelligent Transportation System**

Intelligent Transport Systems (ITS) basically refers to the application of information and communication technologies in vehicles and transport infrastructure to improve traffic management and encourage synergies with mass transit, particularly in urban areas. Some examples of transport management systems include GPS-based optimisation of public transport, computerised traffic signalling, information systems, such as e-ticketing and e-information. Such actions increase the reliability, safety, efficiency and quality of transport systems. An increase in the overall efficiency of the transport management system can reduce traffic congestion and, in doing so, lead to an improvement in the

quality of service of public transport systems, which in turn is expected to lead to an increased adoption of public transport instead of private vehicles, thus, leading to a reduction in the associated GHG emissions.

The components of ITS generally include:

- **Data Acquisition Systems:** This includes sensors, automatic vehicle identifiers (AVI) and GPS. Sensors are used to obtain traffic parameters, such as vehicles count, occupancy and speed. AVI systems are used to specifically identify a vehicle and its speed on road. GPS systems are used to identify the vehicle location and velocity in real time. Travel time, speed, distance and delay are estimated with help of GPS systems.
- **Data Communication Systems:** Data captured using data acquisition systems needs to be effectively communicated to its intended users, such as control centres and public display systems. Wireless technology is normally used for data communication systems.
- **Data Management Systems:** To generate short- and long-term trends, data gathered through acquisition systems must be “clean” and removed of “garbage” values. Data management systems are used to clean data, which can then be aggregated or disaggregated. Subsequent system analysis is done to forecast traffic status and generate effective traffic management policies. Based on forecast status, real-time decisions could be taken to prevent congestion, etc.
- **Display Systems:** These are used to convey information to travellers using Message Signs, Radio, SMS, etc. Display systems can also provide information on travel times, travel speed, delay or accidents, etc.

ITS could be applied to various areas as highlighted below:

1. **Advanced traffic management systems:** These systems integrate various sub components, such as CCTV, sensors for vehicle detection, communication and messaging into a single system for real-time traffic monitoring so that traffic management efficiently communicates real-time information about traffic conditions, incident detection, and signal control, and predicts traffic trends in real time to avoid congestion.
2. **Advanced traveller information systems:** These systems provide travel related information to users, such as estimated travel times of buses on bus stops, route selection, and parking availability, so that users can take intelligent decisions as per their convenience.
3. **Advanced public transport systems:** This includes passing of real-time information on public transport to passengers, such as estimated time for bus arrival at bus stops, bus schedule and information on delays, etc.
4. **Advanced rural transport systems:** These systems provide information about road and weather conditions, which can be valuable for users travelling in rural areas.

5. Commercial vehicles operations: These systems are implemented to track commercial vehicles, such as trucks and taxis, for enhanced safety.

Establishing a proper traffic management system will go a long way in solving Bhutan's transport challenges in urban areas, in particular, and help achieve its target of reducing GHG emissions from the transport sector. The proposed BRTS in Thimphu can be implemented with the application of ITS to enhance the effectiveness of the proposed mass transit system. The inter-dzongkhag bus transport systems can also be benefitted by implementing ITS technologies, such as smart displays and vehicle information systems for commuters. A feasibility study on ITS has been conducted and certain recommendations such as cashless e-ticketing in Thimphu, have been piloted.

4. Other measures

▪ Regulation of workshops and private transport service providers

Some of the other regulatory measures to be adopted are regulating the activities of automobile workshops to check standard processes are followed during vehicle repair/maintenance and there is effective systems in place to manage scrap, manage oil, fuel collection and dispose it off in environmentally safe manner.

Undertake regulation of private transport operators in terms of service level parameters to make public transport more reliable as well as convenient.

Similar type of regulation is required with respect to taxi operation. The cap on taxis led to high demand of taxi services resulting into taxi drivers to overcharge to 100%-150% of approved rates by RSTA.

▪ Capacity assessment as well as building with respect to urban transport management

There are capacity gaps with respect to tackling various urban transport related issues traffic planning and management, hierarchical road planning as well as road asset management, transport oriented development, PPP structuring of various urban transport modes, ICT/ITS based solutions, safety planning and designs etc.

▪ Innovative financing for sustainable transport

Urban transport improvement is quite capital intensive as indicated in earlier sections of this chapter. Funding will be required by Thromdes to construct bus stop infrastructure, pedestrian linkages, safe crossings, procurement of electric connections for bus stop lighting, and the upgrading of the city bus terminal. Similarly, funds are required for procurement of additional bus fleet, providing bus services, ticketing and revenue collection, and implementing customer-focused systems aimed at stimulating demand for public transport. Conventional budgetary allocations may not sufficient to address these requirements. As a result there is a need to enhance the funding through

various innovative sources such as formation of dedicated urban transport fund consisting of fuel tax, toll tax, congestion charging, new vehicle registration fees, penalties for not adhering to standards, etc; Land value capture through sale of higher Floor Space Index (FSI) over transport corridors; advertisement, licensing of commercial space, bond financing, green climate funds, PPP in transport.

Thromdes ability to generate revenues are governed by the Thromde Finance Policy which empower them to levy taxes, duties, charges, tolls, etc. Presently there is a shortfall between the income and expenditures of Thromdes⁴⁸. To reduce this shortfall, Thromdes should be encouraged to explore other innovative sources of financing such as land value capture financing, congestion charges, etc.

- **Inclusiveness**

The public transport planned should be designed in such way that it effectively captures requirement of all the citizens such as women, children, senior citizens as well as disabled within infrastructure as well as services. Priority to be accorded towards safety and security of women as well as children.

⁴⁸ Analysis of financials of Thimphu Thromde, <http://www.adb.org/Documents/RRPs/?id=44240-014-3>

Chapter 5: Civil Aviation

Commercial civil aviation activities in Bhutan first took place with the onset of air services by Druk Air in February 1983, with an 18 seater Dornier aircraft. Gradually demand for air services increased and Druk Air employed a second Dornier to meet the additional requirement. Limited capacity and increasing cost made it essential for the airline to replace the Dornier aircrafts by a larger capacity aircraft and BAe 146-100 series of four engine aircraft were deployed. As aviation demand grew further, Airbus A 319 and ATR 42-500 were introduced in the year 2004, which continue to operate presently.

To facilitate the sector development, RGOB established the Department of Civil Aviation (DCA) in January 1986. Prior to this, Druk Air was responsible for regulating the operations as well as maintenance of the airport infrastructure. The DCA under MoIC was responsible for providing air traffic services, operating airports, setting and monitoring safety standards and for all other regulatory aspects of the civil aviation system. It was subsequently empowered with the enforcement of Civil Aviation Act 2000. More recently, the DCA has been split into two - Department of Air Transport (DoAT) and Bhutan Civil Aviation Authority (BCAA) by bifurcating the operational services from the regulatory functions. The legislation has also undergone changes after the enactment of Civil Aviation Act 2016.

The following section presents an appraisal of the current scenario of aviation sector.

5.1 “As-Is” Assessment

There is a strong correlation between aviation & tourism. The connectivity provided by air transport facilitates the tourism industry. Each new flight added at any airport contributes to the economic development. Expansion in tourism further stimulates the need for better transport infrastructure. The figure below demonstrates this correlation. The aviation traffic witnessed a CAGR of approximately 14% in the last two decades. During the same period, Bhutan’s earnings from tourism grew at a CAGR of 17% in the last two decades.

Tourism Receipts & Aviation Traffic Trend

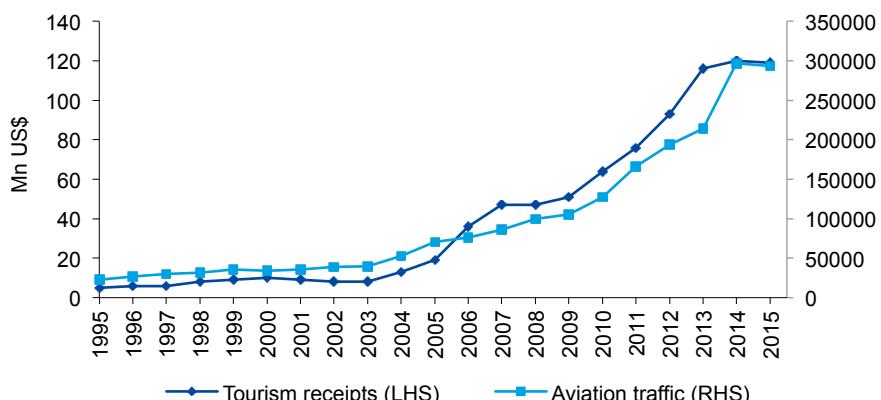


Figure 50: Tourism receipts and aviation traffic trend

Source: World Bank data, MoIC, KPMG Analysis

The passenger traffic in 1995 stood at around 22,000 p.a. and has reached to over 293,000 p.a. by 2015. It has outperformed South Asia's aviation growth which grew at around 8.5% between 1995 and 2015. While the international traffic has shown a high growth, the domestic sector, which started operations in 2011, is still at its nascent stages and stands at 4,600 passenger's p.a as of 2015.

International Traffic Growth

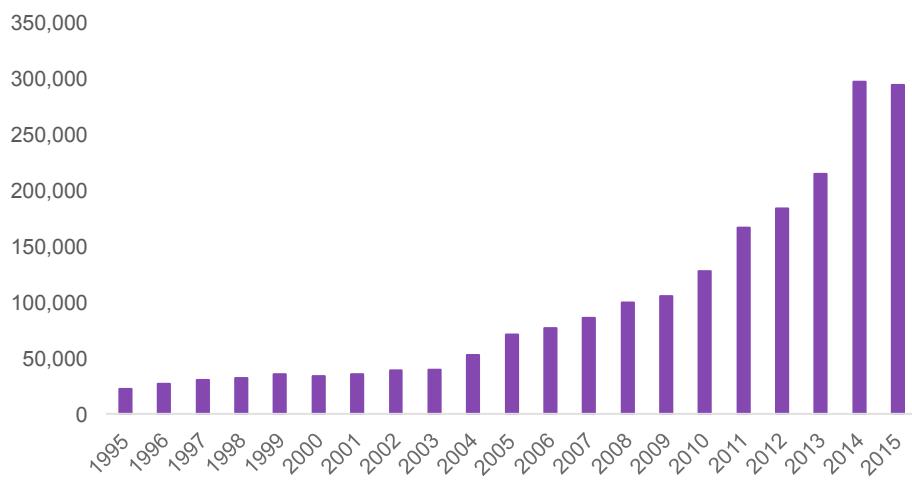


Figure 51: Passengers growth per year

Source: MoIC Annual Infocomm Report 2016

Domestic Traffic Growth

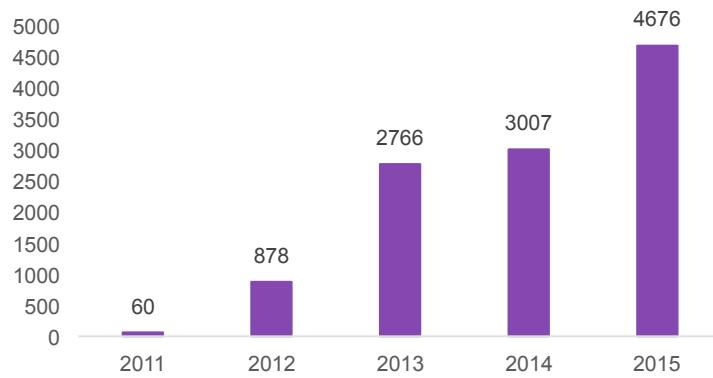


Figure 52: Passengers in domestic market

Source: MoIC Annual Infocomm Report 2016

Growth in aviation is hinged upon having sufficient aviation infrastructure. The main airport of Bhutan is Paro International Airport (PIA), the country's only international air transport gateway, is located approximately 50 kms from Thimphu, in the western region.

PIA was inaugurated in 1983 and has been subject to continuous improvements. Currently, the runway is 2265 x 30 meters, oriented 151/331 degrees with displaced thresholds at both runways. The airport is at an elevation is 2,225 meters above sea level.

In 2015, the capacity of PIA stood at 330,000 passengers per annum (ppa), a 9 times increase from about 34,000 ppa in 2000. With the development of a new terminal in November 2015, the terminal can handle upto 800,000 ppa, as per the DoAT.

The towers at the Paro airport are equipped with VHF and HF communication equipments. A designated PRO (a VOR type navigational beacon) is placed 5.7NM south of runway 33 threshold. A DME (distance measuring equipment) is also located with a PRO. The 1996 UN Report recommended using the VOR for a “cloud-breaking” procedure thus improving regularity substantially. For safe landing procedures, the aircrafts need to maintain an altitude of 13,500 feet until passing the VOR at 5.7 NM distance from runway 33 threshold. On days when the weather is clear and the airport is visible, descent can be undertaken as per visual flight rules (VFR) to the airport elevation of 7,333 feet must be completed over the NM 5.7 distance.

Usually the airport is visible before the aircraft has reached the NM 5.7 distance, thus enabling VFR to be initiated earlier. Another popular method followed by airlines due to prevailing southern winds is to descend at a reduced angle. This requires to make a circling procedure north of the runway and land on runway 15. Owing to the surrounding terrain, this practice is complicated and requires on-the-job training for pilots.

A missed approach point is designated at distance 1.7NM for the airport. If the airport is not visible at 13,500 feet when passing this point, then the aircraft is required to climb to 16,000 feet. From this height then, either a new approach or deviation to an alternate airport will be initiated.

While Paro airport, located in western region, has been in operations for a considerably long time, the other regions - center, south, and east, had been devoid of domestic connectivity till recently. To redress the regional imbalance and improve accessibility, RGOB developed three domestic airports, well distributed geographically to push tourism growth in the eastern and central parts of the country. Domestic flight operations started at Bumthang and Yonphula in December 2011 and at Gelephu in 2012. The airport at Yonphula in the east is currently suspended for operations due to runway rehabilitation work, which is expected to be completed by July 2017. The government has partially completed construction of a new airport at Bumthang, located in the center of the country, but a suitable passenger terminal building is yet to be constructed for this airport.

Due to the difficult terrains and weather conditions, air navigation and airport development procedures are faced with unique challenges. These factors also attribute to limited capacity of airports. Safety, security, and capacity must be strengthened to prepare for the anticipated increase in aircraft movements and passenger volume.

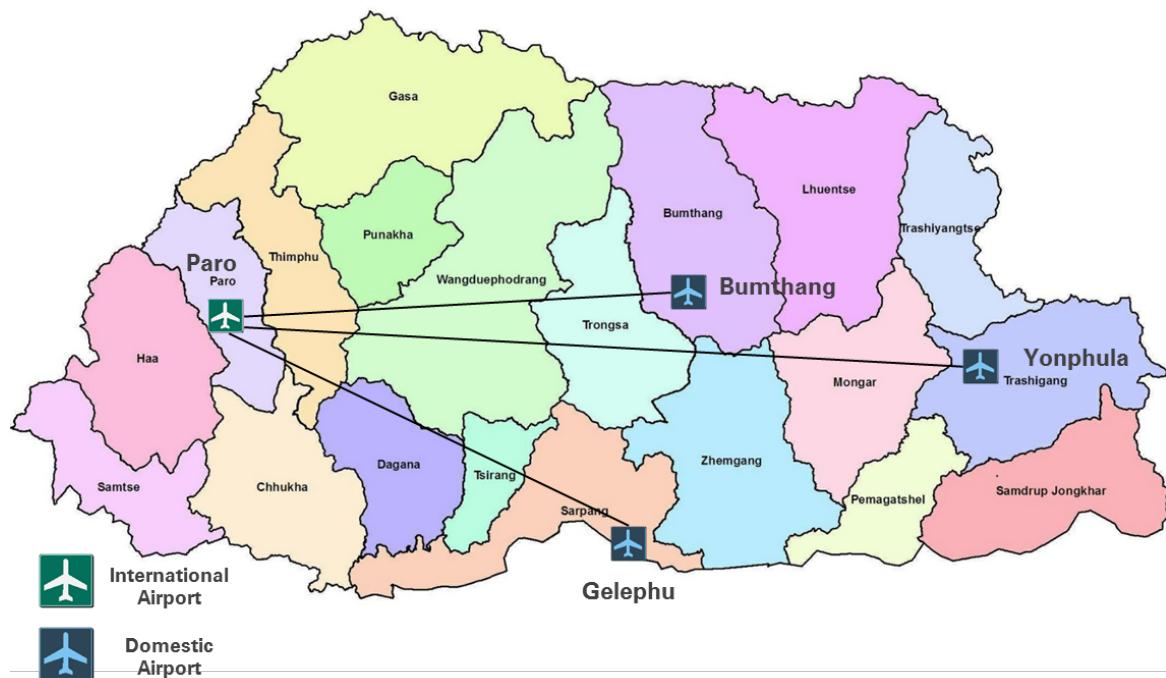


Figure 53: Location of international and domestic airports
Source: DoAT, ADB Air Transport Sector Assessment Report

The various statistics related to these airports are listed in the table below:

Type of Airport	Place	Altitude/ Elevation above MSL	Runway length	Runway width
International	Paro	2237 m	2265 m	30 m
Domestic	Yonphula*	2573 m	1300 m	30 m
Domestic	Bumthang	2550 m	1200 m	30 m
Domestic	Gelephu	300 m	1500m	30 m

*Domestic services are suspended at Yonphula due to runway rehabilitation, which are expected to resume by July, 2017

Figure 54: Key statistics of each airport
Source: ADB Air Transport Sector Assessment Report

There are two airlines in Bhutan. Druk Air, is the national carrier of Bhutan with a fleet consisting of three Airbus A319s and an ATR 42-500. It provides services to 11 different cities spread across 6 countries - India, Bangladesh, Nepal, Thailand, Singapore & Maldives (as of December, 2016). Tashi Air, is a privately owned company, incorporated in 2011 and has a current fleet comprising of two Airbus A319s. It operates on the following international markets - India, Nepal & Thailand in 4 cities and has plans to expand its route network to Bangladesh & Singapore in the near future. The below figures depicts the routes and connectivity provided by Druk Air for international and domestic operations.

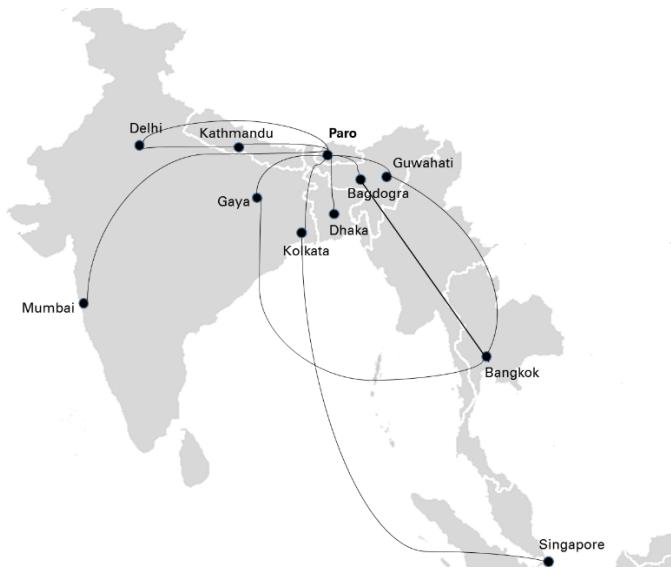


Figure 55: International route map of Druk Air

Source: Druk Air website, KPMG Analysis

Druk Air's domestic operations link all the geographical regions of the country. Paro International airport has connectivity to all the other three airports. The figure below represents the domestic connectivity of Druk Air.



Figure 56: Domestic route map of Druk Air

Source: Druk Air website, KPMG Analysis

Tashi Air started its operations as a domestic carrier however discontinued domestic operations in a short timeframe and ventured into international operations from Oct 2013 with its first flight to Bangkok. By December 2013, it expanded its route map to Kolkata. Presently, it has flight operations to Delhi and Kolkata in India, Kathmandu in Nepal and Bangkok in Thailand.



Figure 57: Tashi Air's International routes
Source: Tashi Air website, KPMG Analysis

Bangkok is the biggest market for both the airlines, accommodating 28.9% share among the different international sectors in 2015. Paro's connectivity to New Delhi forms the second biggest market with approximately 48,000 or 16% of the international passengers that travelled in 2015. Flight traffic to India collectively accounts for 33% of the overall aviation traffic. These destination trends have remained similar from the past year enhancing the importance of increasing capacity on these high density routes. The key routes with their share of traffic is presented below.

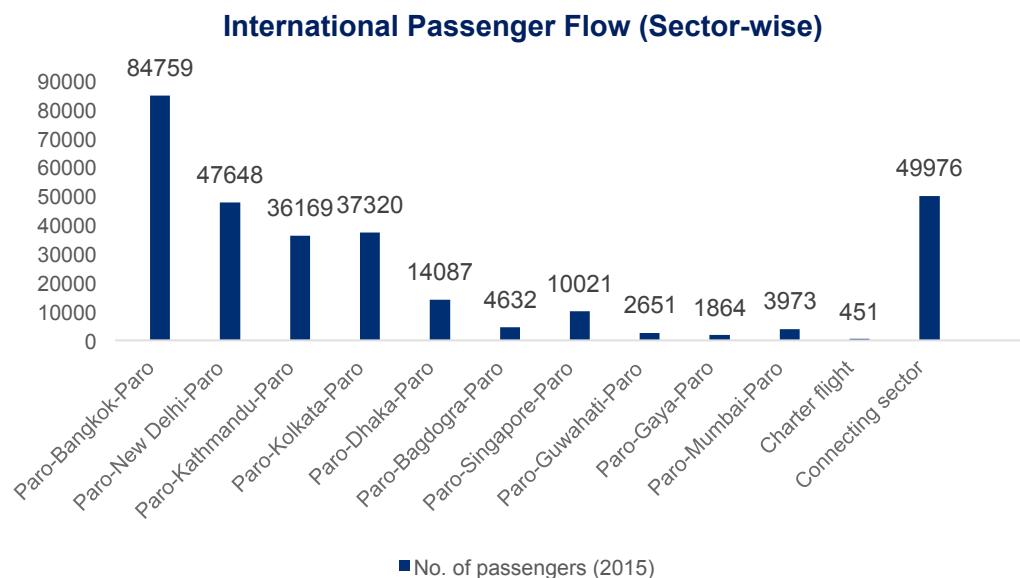


Figure 58: International Passenger Flow (Sector-wise)

Source: MoIC

As per DoAT, there are 61 helipads across the country, with only 7 helipads in the Northern part of the country (Bumthang, Gasa & Lhuentse). The map below the relative distribution of helipads across Dzongkhags. Services are provided by Royal Bhutan Helicopter Services Limited (RBHSL), a State Owned Enterprise incorporated in July 2015. They have employed A5-BHT and A5-BHS helicopters in their fleet. The services started primarily for search and rescue, air medical evacuations, firefighting, moving cargo, movement of VIP and government officials. In the last one year, RBHSL ventured into commercial operations as well. The same can be booked through their website.

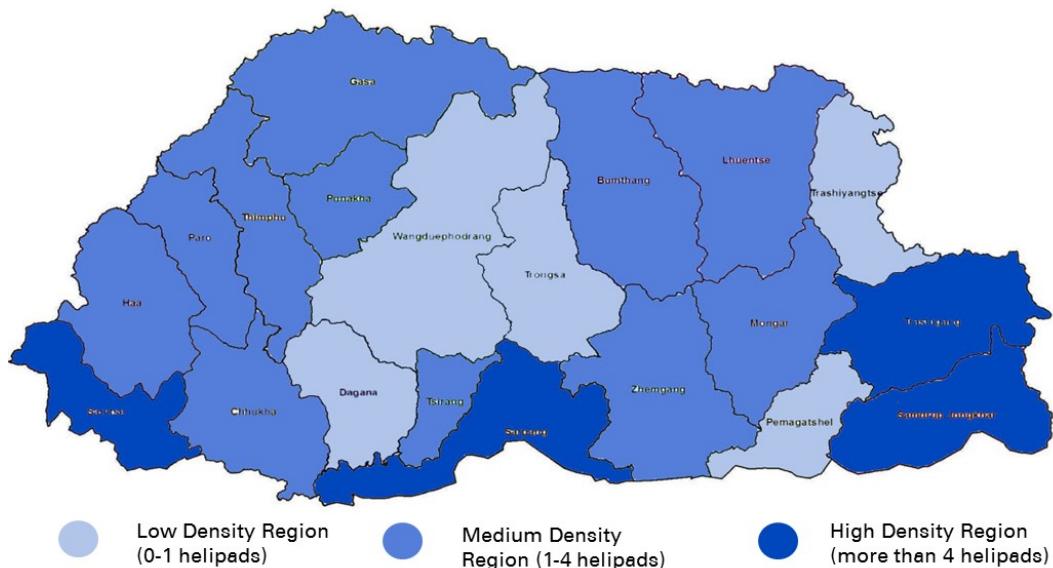


Figure 59: Distribution of helipads across Bhutan

Source: KPMG Analysis

5.2 Scenario by 2040

ADB has made projections in the growth of aviation traffic. As per the forecasts, the passenger count is expected to grow at a rate of more than 10% till 2020. The growth rate thereafter is expected to slow down to around 6% in long term. It is expected to reach approximately 0.5 mn by 2020, 0.9 mn by 2030 and 1.6 mn by year 2040. The share of domestic aviation in the pie is expected to grow significantly from the current levels. It is projected to contribute to 12% of the total traffic by 2020 and 17% in the long-run as per ADB's assessment. This would entail a significant push by Tourism Council of Bhutan (TCB) to implement the development plan prepared to enhance tourist growth in eastern parts of Bhutan.

Aviation Passenger Count

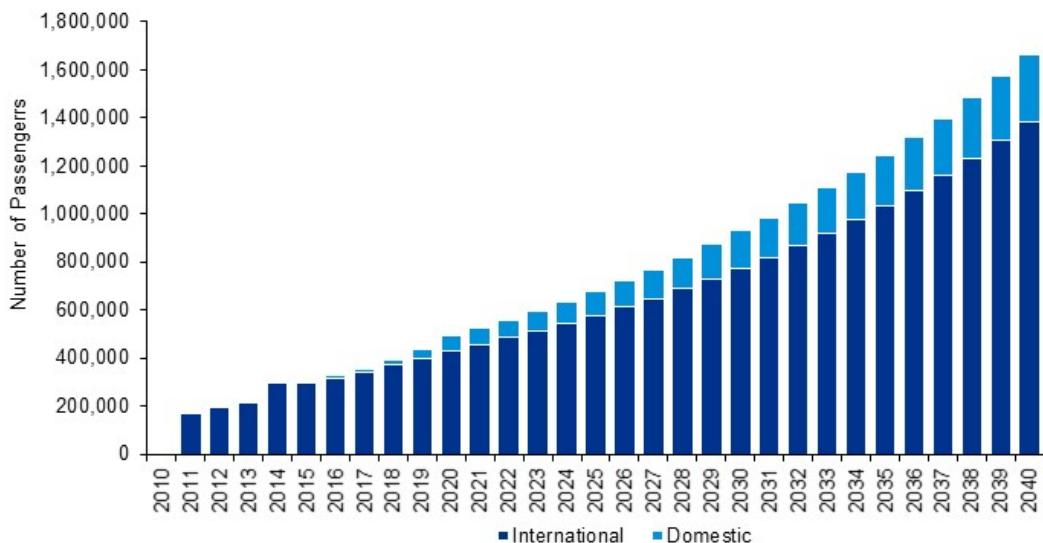


Figure 60: Air traffic projections
Source: ADB, KPMG Analysis

Forecasts have been made on the amount of emission that aviation sector is going to contribute based on the projected traffic growth. It is projected that the total emission levels (CO₂, SO₂ and NOX) will be nearly 3 times the current levels by 2040. The chart below presents the baseline and the year on year growth in emission levels. The methodology and assumptions used for calculation is annexed to this report.

Total Emissions

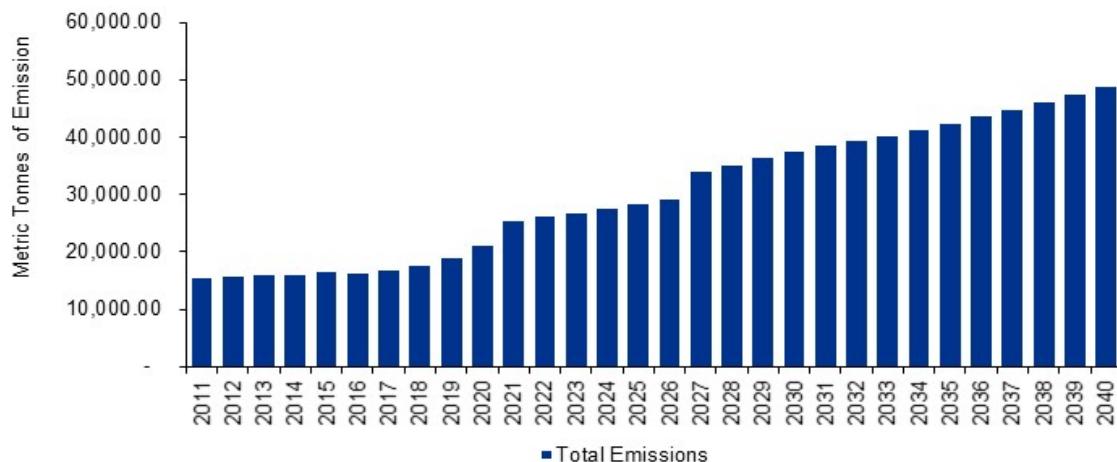


Figure 61: Emission projections
Source: KPMG Analysis

5.3 Challenges in aviation sector

- Low volumes in international traffic

Despite Bhutan's aviation sector witnessing a high growth as compared to South Asian market in the last decade, the volume of international traffic handled in absolute terms is still low. To drive up the international traffic will require a host of measures including initiatives which the TCB can undertake. From aviation perspective, the aircraft operators can enter into alliances with other international airlines. The main benefits of alliances are:

- a. Greater network access
- b. Seamless travel
- c. Transferable priority status
- d. Extended lounge access
- e. Enhanced frequent-flier program (FFP) benefits

Various possible forms of alliances are:

- A. **Interline Alliance:** The Interline Alliance is simplest of them all. It involves low level of co-ordination on few routes. Potential areas of co-ordination include ground handling, joint use of ground facilities, code sharing and joint operations, block space sale, and co-ordination of flight schedules for directly related flights.
- B. **Broad Commercial Alliance:** The Broad Commercial Airline Alliance extends the areas of co-ordination to joint development of systems and joint marketing activities. It is wider for it may comprise of code sharing and sharing frequent flyer programs. This may also include transfer of traffic at hub airport to other airline. An example is the One World Alliance that was founded on February 1, 1999. The founder members of the Alliance are American Airlines, British Airways, Cathay Pacific and Qantas. Later, in September 1999, Finnair and Iberia joined in the alliance. This expanded further with the inclusion of Aer Lingus (June 2000) and LAN Chile (June 2000). This alliance has assets of nearly 2000 aircraft with more than 300 still on order. It is spread in more than 130 countries across more than 550 destinations, employs nearly 260,000 people. This is an example of how the alliances can be useful to customers for they can offer the benefits that are way beyond the reach of individual airlines.
- C. **Equity Alliance:** In Equity Alliance, as the name suggests, there may be equity swap among the partners. Thus, the partners generally co-operate in all areas of joint activities. It may involve code sharing on a large number of routes so that all the partners gain the leverage from the strategic alliance they have entered into. The alliance between American Airlines and Canadian Airlines International of 1994 is an example of this kind of alliance. AA invested US\$190 million in equity and voting shares of CAI. This is most durable type of alliance, but the proportion of such type has declined and the carriers mostly enter into commercial alliance.

While the above efforts can be undertaken between airline operators, the government can play its role in facilitating the same. This arrangement is expected to facilitate the drive towards increasing passenger footfall in the airports of the country.

- Low domestic traffic

While international traffic volumes are low, domestic operations which started in 2011 have not still not achieved a critical mass that helps in achieving sustainability of commercial operations. Domestic aviation constitutes less than 2% of the overall traffic at present. The 3 domestic airports namely Yonphula, Bumthang and Gelephu remain underutilized as a result of this. Similarly, the carrying capacities of domestic air carrier remain grossly underutilized due to such low amount of domestic air traffic.

The tourists primarily visit the western parts of the country as compared to its eastern side. Paro, Thimphu and Punakha, saw the highest number of visitors in 2016 together accounting for 75% of the total visitors. The table below shows the trend of tourists visiting each Dzongkhag.

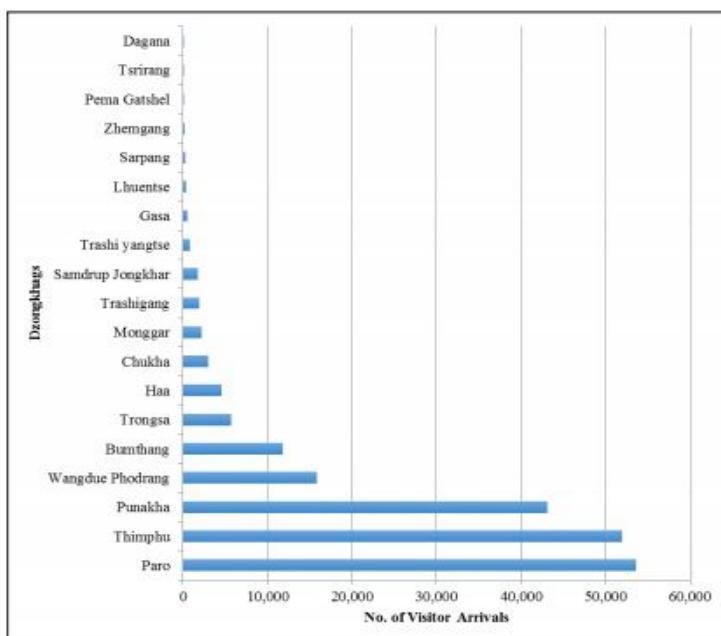


Figure 62: Number of visitor arrivals by Dzongkhags
Source: Annual Report 2016, Bhutan Tourism Monitor

TCB has recognized this skewed pattern in tourism industry and has been making efforts to plug this anomaly. They've promoted 'home-stays', developed new trek routes and taken tour operators to familiarize. Additionally, they've developed a tourism plan for the Eastern Circuit which includes six Dzongkhags of Mongar, Lhuentse, Trashiyangtse, Trashigang, Pema Gatshel and Samdrup Jongkhar. Two circuits have been identified by grouping these Dzongkhags into groups of three each. All these issues need to be resolved to give a significant boost to tourism to this part of Bhutan. The tourism development plan for Eastern Bhutan has been broken into two circuits. The plan for Circuit 2, which encompasses the dzongkhags of Trashigang, Pema Gatshel and Samdrup Jongkhar, was

completed in 2013. The Tourism Development Plan for Circuit 1, which encompasses the dzongkhags of Mongar, Lhuentse, and Trashiyangtse, was completed in 2015. The effective implementation of Eastern Circuit Tourism Development Plan will lead to a significant increase in the domestic air traffic and will boost the utilization of domestic flights and airports.

Apart from development of eastern circuit, TCB can additionally explore balloon rides for tourists. Interactions with TCB reveal interest shown by operators such as Myanmar based “Balloons over Bagan”, which however did not fructify due to lack of clarity on air regulations and related approvals, permits.

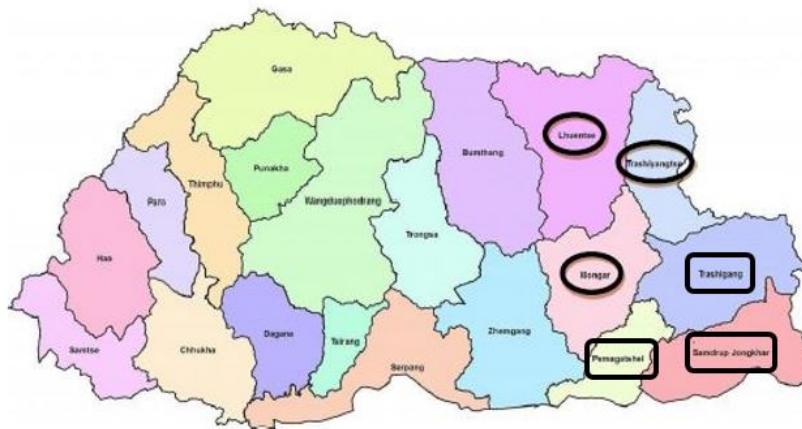


Figure 63: Map of the 20 Dzongkhags of Bhutan

Source: Circuit Tourism Development Plan Report, KPMG Analysis

Note: Circled Dzongkhags are part of Circuit 1 Plan while the rectangle Dzongkhags are in Circuit 2 Plan

- Constraints at Paro Airport

Paro Airport in Bhutan is 2237 m above sea level and surrounded by sharp peaks of up to 18,000 ft tall. Strong winds whip through the valleys, often resulting in severe turbulence. Boeing states that Paro airport is 'one of the world's most difficult for takeoffs and landings'. Flights are only allowed during the daytime and under visual meteorological conditions - strict light allowances in which the pilot must make his judgments by eye rather than rely on instruments as is the case in nighttime flights. Paro airport cannot be used in adverse weather conditions. A 'wind curfew' is imposed during the months of February to May which limits the operating window. Consultations with airline operators indicate that turbulent weather conditions typically result in 15 to 20 diversions a year. Lack of supporting infrastructure, including fueling facility, at the domestic airports results in flight typically diverted to nearest airports outside the country. The constraints of the airport need to be addressed by augmenting the supporting infrastructure system at alternate airports of Gelephu or Bumthang.

- Age of aircraft

While undertaking consultations, one of the concerns observed by DoAT and BCAA was on the age policy for the aircrafts. Druk Air presently has two aircrafts (A319) which are 14 years in age while Tashi's fleet of two A319 have crossed 17 years. There are multiple

guidelines and regulations applied in various countries on the age of aircraft. Normally manufacturers of jet aircraft prescribe a design economic life for their aircrafts which extend to 20 years or 60,000 landings/ pressurization cycles. The purpose behind having this minimum standard in life of the aircraft is to ensure that the aircraft does not have problems of corrosion, fatigue, metal fatigue, cracks etc. in areas which are normally not accessible during even major checks. It is with a view to check the age related problems of the aircraft that the manufacturers indicate a design-economic life in terms of years and pressurization cycles for the jet aircraft.

Sometimes, private operators are keen to bring aircrafts which are very old, at times exceeding twenty years in age. To keep in check this practice of bringing old aircrafts, various countries have put regulations on the age of aircraft. The restrictions on aircraft age vary dramatically depending on the jurisdiction in question. The maximum age for importing passenger aircraft into China is 10 years, compared to a 40 year age limit for operating aircraft on the Kyrgyzstan register.

India's Civil Aviation Authority has mandated the following clauses on the pressurized aircrafts intended to be imported and used in scheduled, non-scheduled and general aviation operation. The aircrafts should have flown at least for 100 hours during last six months and should not have completed:

- i) 15 years of age or 75% of design economic life or 45000 pressurisation cycle or
- ii) 18 years of age or 50% of design economic pressurisation cycle.

Also, in the case of unpressurised aircraft, the decision will be on a case to case basis and on a complete examination of the record of the aircraft being procured. However, Director General of Civil Aviation would normally not allow such aircraft which are more than 20 years old. Aircraft intended to be imported for air cargo operations shall not have completed 25 years in age or 75 percent of its design economic cycles or 45,000 landing cycles.

Turkish Civil Aviation has also changed age regulations on aircraft in 2013. It does not allow the operations of passenger transportation purpose aircrafts older than 15 years old starting to count from the first registration date to Turkish Civil Aircraft Registry. The limit for freight transportation purposes is 25 years. Iran reduced its age restriction on aircraft from 15 to 10 years, after the crashes of a Tupolev 154 (involving 168 fatalities) and an Ilyushin 62 (involving 16 fatalities) within 10 days of each other in July 2009. The Indonesian Ministry of Transport in 2015 amended Indonesia's Civil Aviation Safety Regulations forbidding the importation, registration and use of commercial passenger aircraft older than ten years of age while freighters are limited to fifteen years of age.

Going by the disparity in age restriction regulations in various countries, it can be deduced that there are no hard technical reasons for such limitations. Most of the Asian economies, however, have limited the aircraft age for passenger aircrafts to 10-15 years. Bhutan should also limit the maximum age of the fleet for operations by scheduled commercial air operators. Given the inclement weather conditions in Bhutan, the age limit for pressurized aircrafts should be set to 12 years. The restriction can be made applicable from year 2020.

It may be noted that the aircraft age restrictions are typically a part of regulations and not part of the sector's policy document.

- Single vs Twin engine

Another concern raised by Bhutan's aviation department and the regulator is regarding the policy on single or twin engine. Both twin and single engine have their own pros and cons. When weighing out these pros and cons of both types of aircrafts, most operators think of safety first. Having the redundancy of a second engine means that in the case of an emergency where one engine quits and the aircraft has enough altitude, the second engine will provide the pilot with the ability to navigate to an emergency landing location. Aircraft with twin engines also generally have more backup components such as twin starter generators which provide additional safety in the event of failure.

There are also performance and operating cost differences between single engine and twin engine turbo-props. In general, twin engine aircraft allow for faster speeds, and faster pickup, while single engine aircraft have lower operating costs, due to maintenance and fueling for only one engine. Considering the safety and performance aspects, twin engine aircrafts have an upper hand over single engine aircrafts.

Single engine aircrafts are also widely used in many countries. In 2003, Boeing 737-700, a single engine aircraft, had successfully completed technical demonstration test flights at Paro International Airport. It proved its performance capabilities and verified procedures for safe take-off and landing operations in high elevation, high terrain environments being a single engine aircraft. Such demonstration tests can be further conducted with single engine aircrafts. A detailed feasibility assessment will need to be undertaken for determining the effectiveness and performance of single engine and for unpressurized aircrafts in case of Bhutan. Based on the results of the DFR, a case for single engine or unpressurized aircrafts can be established. Till such time, twin engine pressurized aircrafts should be used for all scheduled commercial air operators. It may be noted that this also should form a part of the regulations and need not be stated in the policy document.

- Aviation safety & security

Modern safety management principles lead to safety risks being addressed more strategically by regulators and aviation service providers. Since air traffic is projected to increase significantly in the next 15-20 years, safety risks must be addressed proactively to ensure that this significant traffic expansion is carefully managed and enabled through strategic regulatory and infrastructure developments. In November 2013, a new Safety Management Annex became the first Annex to be added to the Annexes to the Convention. The International Civil Aviation Organization (ICAO) Annex 19 - Safety Management stipulates the requirements for States/ Administrations to establish a State Safety Program (SSP) in order to achieve an acceptable level of safety performance (ALoSP) in civil aviation. This Annex consolidates the overarching safety management provisions from Annexes 1, 6, 8, 11, 13 and 14 for personnel licensing, operation of aircraft, airworthiness of aircraft, provision of air traffic services, aircraft accident and incident investigations and aerodrome operations. As a means to verify satisfactory performance of the SSP and

service providers' safety management system (SMS), States/ Administrations are also required to establish the ALoSP to be achieved.

Currently, Bhutan is still striving to get all the safety parameters mentioned in the ICAO guidelines in place. ICAO has pointed out that there remains a lack of effective implementation of its requirements in all eight critical areas required for effective oversight, but that it is especially concerned with shortcomings in four specific areas. The four areas ICAO identifies as weak are: lack of legislation, organisational weaknesses, lack of an accident investigation section, and problems with air navigation services. Bhutan's effective implementation is currently the lowest in the South Asian region at 38.8%⁴⁹ as against the global average of 62%. The score reflects that the government's oversight over the aviation industry does not comply with international standards, and that it has struggled to keep up with the industry's growth since as far back as 1999, when the first ICAO audit was carried out.

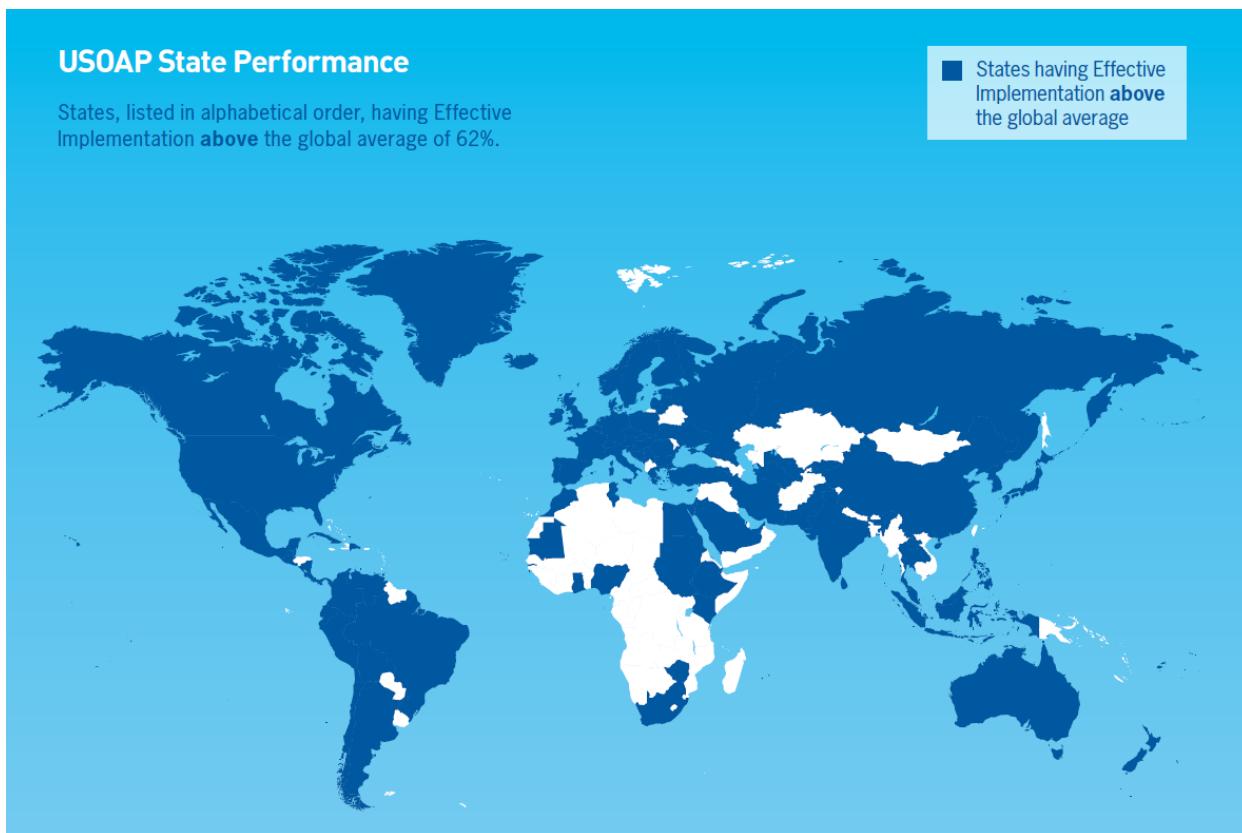


Figure 64: Bhutan's Safety Oversight in comparison to other countries
Source: ICAO Safety Report, 2015

- Emissions

Four kinds of gases make up the main emissions from aviation. These are carbon dioxide (around 70 per cent of total emissions), water vapour (30 per cent), and minuscule proportions of nitrogen oxide and sulphur oxide. About two per cent of global carbon

⁴⁹ <http://www.kuenselonline.com/icao-concerned-about-bhutans-aviation-oversight-weaknesses/>

dioxide emissions can be attributed to aviation. Though the absolute quantities may be small relative to other transport modes, these are very large relative to passenger kilometres performed. The effects of the emissions are especially pernicious as the largest quantities of these take place at high altitudes where their warming potential is greatest. As per the projections, the GHG emission levels within Bhutan as a result of growth in aviation is expected to reach 3 times the current levels.

- Emerging technologies like drones

Drones as a class of machines encompass Unmanned Aerial Vehicles (UAVs), Unmanned Aircraft System (UAS), Remotely Piloted Aircraft Systems (RPAS), or Remotely Piloted Vehicles (RPVs). Drones can also be model aircraft or military weapons. Drones have been commercially found to be useful by the media, emergency services, scientists, farmers, sports enthusiasts, hobbyists, photographers, the armed forces and government agencies. There are many international companies (such as Amazon, Dominos) who are working on full scale deployment of drones in their supply chain making it an essential component of the processes. Every industrialized country in the world is making investments in drones, thus driving the scope and technological developments for applications in the commercial UAV market.

Drone technology is one field which is developing faster than the laws that regulate it. Currently many countries like the U.S.A., the U.K., the EU, India, Bangladesh etc. have regulations specific to use of drones. Many countries like Argentina, Brazil, Iran etc. have banned the use of drones whereas countries like Australia, China etc. need the operators to have pilot license.

UAS related rules in the U.S.A. requires registration and strong oversight. The rule's provisions are designed to minimize risks to other aircraft and people and property on the ground. The regulations require pilots to keep an unmanned aircraft within visual line of sight. Operations must take place during daylight hours, or within the hours of civil twilight if the drone has anti-collision lights. The new regulations also address height and speed restrictions and other operational limits, such as prohibiting flights over unprotected people on the ground who aren't directly participating in the UAS operation. Under the final rule, the person flying a drone must be of least 16 years of age and have a remote pilot certificate with a small UAS rating, or be directly supervised by someone with such a certificate.

The European Union does not regulate the civilian use of remotely piloted aircraft within 150kgs or less. They are guided by general rules and principles. Officials state that The EU is working on harmonizing laws and coming up with a pan-European framework. The U.K. has a different framework. Drones are covered under a patchwork of English laws, including aviation laws, which are regulated by the Civil Aviation Authority (CAA). Drones with cameras attached must not be flown within 150 meters of a very congested area in UK, or within 50 meters of a person, vessel, vehicle, or any other structure that is not under the pilot's control. Any person using a drone for commercial purposes must obtain a license from the CAA.

In India, Directorate General of Civil Aviation (DGCA) regulates the use of drones. Every drone sold in India must have a Unique Identification Number and every person flying a drone must have a permit. For flying a drone below 200 feet from ground level, a permit from local administration is required. If the flying is above 200 feet, permission from the DGCA is needed; also an application for this permit needs to be submitted at least 90 days before actually flying a drone. Only Indians or companies controlled by Indians can register their drones under the suggested rules. The DGCA is currently in the process of reviewing the responses to its recommendations from the stakeholders.

Bhutan is in the process of drafting rules and regulations for use of drones. The fear of invasion of privacy, data theft and armed misuse of drones are powerful and credible. The regulations needs to address such risk factor in drone usage.

- Use of Balloons or Gliders

A balloon is a lighter-than-air aircraft that is not engine driven, and that sustains flight through the use of either gas buoyancy or an airborne heater. Many countries like Philippines, Myanmar etc. have used this aviation mode to boost tourism. Its use is subject to registration in most of the countries (e.g. the U.S.A, Canada etc.). Even the pilots are licensed to operate a hot air balloon.

Hot air balloons fly when winds are at their most stable, usually shortly after sunrise or a few hours before sunset. This is because the heating and cooling of the earth during the day create thermal winds, which make conditions unsuitable. During the winter, snow covering the ground reduces thermal activity and balloons may fly throughout the day. There are detailed safety manuals present with the operators and the regulating body present in the country of use.

Like balloons, gliders could be used for promoting tourism activity. A glider is a heavier-than-air aircraft that is supported in flight by the dynamic reaction of the air against its lifting surfaces, and whose free flight does not depend on an engine. Since there's no engine taking up space, a glider is sized around the cargo it carries; the fuselage is designed to be as small and light as possible. Most gliders have seats for two people in the small cockpit. It is mainly used as a tool in sporting activity centered around it. It has been used to promote tourism in many areas of the U.S. and Europe.

The regulations in the U.S.A. allows the gliders union to form standards and carry out operations subject to their compliance to the air safety laws. In Europe, EASA regulates the use of gliders. However, discussions are going on over de regulating this sector to promote this as a sporting activity. The safety requirements include mandatory presence of parachute with the gliders and clear airspace.

In Bhutan, stakeholder consultations revealed that Balloons over Bagan (Myanmar) had approached the government with proposal to operate its balloons over Bhutanese airspace. While the proposal should be given a credible thought and put up for discussion with the concerned stakeholders, the same needs to be supported by operating regulations to use balloons or gliders as a means for promoting tourism.

- Capacity issues

One of the biggest hurdles in improving Bhutan's effective implementation score is the lack of critical professionals like flight safety and airworthy officers. Such officers, after gaining requisite qualifications and trainings, are paid significantly higher by the private sector - preventing the authorities from retaining them. Attempts to swiftly address the critical human resource shortcomings by recruiting international professionals have not proved successful because of unavailability and high costs of remuneration. BCAA is also encountering capability building issues as critical operations are being performed by foreign country authorities. As per BCAA, the staffing is adequate, however the core issue is ad-hoc training program and the need to streamline the same. The capability building is the key to comply with ICAO guidelines and improve effectiveness score. The figure below establishes the aviation sector need gap.

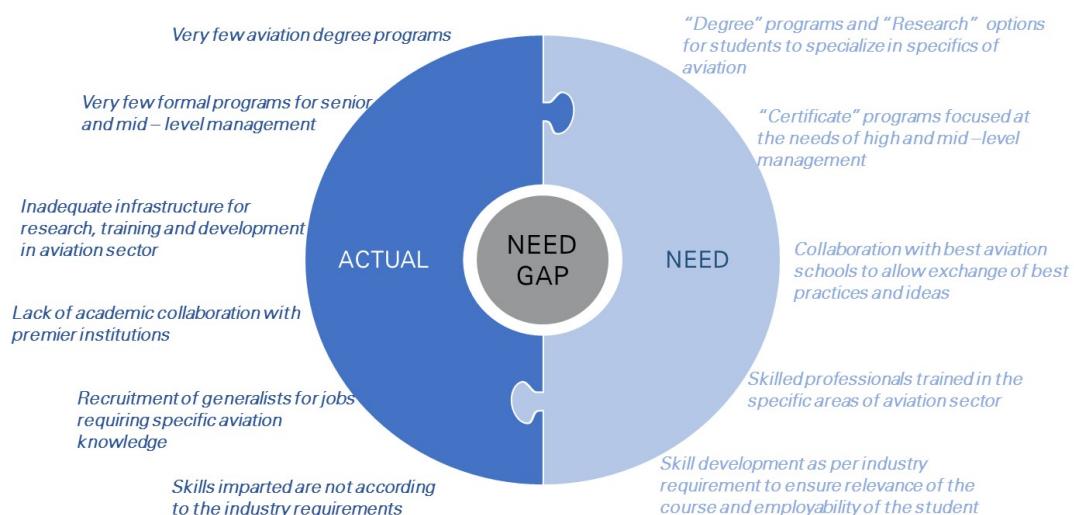


Figure 65: Aviation sector need gap analysis

Source: KPMG Analysis

5.4 Policy interventions required

- Improving international traffic

There are three approaches which Bhutan can adopt to increase its international traffic.

- a. Market identification:** It is important that Bhutan identifies the markets from which it would like to grow its traffic. For example, Bahrain identified that its aviation market is going to be London & Paris on its East and Manila & Bangkok on its West. Similarly, For Bhutanese aviation traffic to grow, it needs to identify 2-3 gateways for collating and expanding international air traffic. Prima facie, Japan, Singapore and Myanmar in addition to the existing traffic from Bangkok present that opportunity. However, market identification should be done by undertaking appropriate consultations between the TCB and the airline operators. It is critical that the carriers see the markets in the same manner as the government does. Aviation plan needs to be dovetailed in the tourism plan of the RGOB.

- b. **Code-sharing:** As highlighted in the previous section, one of the mechanism to address the challenge to enhance the international aviation traffic is by airlines entering into code-sharing agreement.

Bhutanese airline operators can enter into code-share agreements with their international counterparts subject to regulatory approvals. This methodology enables greater network access along with other benefits at no significant increase in operating costs.

A code share flight is a flight that is marketed by one carrier and operated by another. Code share flights come about as a result of agreements between airlines to sell seats on each other's flights in order to provide passengers with a wider choice of destinations. The ticket would be booked on the flight number of the airline that has booked the travel, however it may be operated by another carrier. Code-sharing amongst air carriers became popular within the United States following the deregulation of the domestic air travel market at the end of the 1970s, from there spreading into international markets. The arrangements vary in response to the requirements of each airline and the characteristics of specific routes. Code sharing is particularly evident in alliances between US and European airlines where it is used to obtain traffic feed and distribution outside of an airline's home market. Similarly, various airlines code share in order to increase the frequency of services under their own. Flights from both airlines that fly the same route - this provides an apparent increase in the frequency of service on the route by one airline. Perceived service to less served markets; this provides a method for carriers who do not operate their own aircraft on a given route to gain exposure in the market through display of their flight numbers. Other circumstances in which code sharing may be used include thin routes where traffic is insufficient to support the operation of more than one aircraft. Code sharing is also becoming an increasingly important component of Asian airline operations.

An airline's choice of code share partner on a route with multiple carriers will reflect the benefits which potential partners can provide to the airline. The compatibility of management and operating strategies (for example, quality of on-board service) will be an important consideration in many cases. Code share arrangements may be classified in various ways. One distinction is between 'naked' code sharing, where it is practiced on an incidental and opportunistic basis on a small number of routes, and 'common product' code sharing where it forms part of a broader alliance between the participating airlines.

In Bhutan aviation network, the busiest part is Paro-Bangkok route. The difference in passenger count in this route is significantly higher than that of say Paro-Singapore route. Singapore has one of the world's busiest airports. By having a code share agreement in place with aircraft carriers operating in Singapore airport (e.g. Singapore Airlines), Bhutan's aircraft operators can increase their network to places like Los Angeles, Frankfurt etc.

While it is recognized that code-sharing is essentially an arrangement between airline operators having limited or no say of the government. However, RGOB can play its role as a facilitator. Code-sharing agreements should be liberalized as per the provisions relating to code-share arrangements in the ASA, and no prior approval will be required. However, if it is found at any point of time that the code share agreement violates the ASA, the same shall be disallowed.

- c. **Signing ASAs in consultation with flag carrier:** Apart from code-sharing the alternate route for expanding access to wider markets is the Air Service Agreement (ASA). Currently, Bhutan has ASAs with seven countries (India, Bangladesh, Nepal, Myanmar, Thailand, Maldives and UAE) thus enabling the local aircraft operators to service those routes and bring in wider access to customers. However, ASAs also results in the risks of greater competition in the local market and increased capacity volatility. As a best practice, government should enter into a consultative process with the Bhutanese flag carrier before executing such ASAs to have a more robust and objective appraisal of the costs versus benefits of such ASA.

The above efforts for market expansion are expected to augment the international aviation traffic. Growth in traffic is likely to attract more airline operators. Bhutan should not put any restrictive conditions for entry for new players. Entry should thus be left to the market forces. Essentially, competition is healthy for any sector. Bhutan's aviation sector also witnessed a significant rise in traffic with the entry of second operator Tashi Airlines. However, to ensure that only serious players enter into the business, the government should ensure that BCAA carries out an objective and sound appraisal of the business plan of such prospective operator keen to obtain the license.

- Improving regional connectivity

It is evident that Eastern Bhutan attracts less number of tourists in its eastern geography. The increase in tourists can be undertaken by a host of measures. On one side, TCB needs to expedite its efforts to implement the eastern circuit plan prepared for the six Dzongkhags. Aviation can play a role in improving access to the region.

As a national carrier, Drukair, has been providing access through regular services. There is a need for these services to continue with systematically scaling them up as and when demand increases. The benefits of improved tourism will have a multiplier effect to the economy. However, the present level of domestic demand is not sufficient for financial sustainability of aviation operations. Therefore, RGOB should extend financial support to the national airline to cover operational losses. The support should be continued till a reasonable market demand is established. A mechanism should be established where the case for financial assistance is reviewed in every three years.

The government should concurrently boost aviation access through use of helicopter services. Interactions with RBHSL indicate that there is potential in commercially tapping high-end tourists for eastern parts of Bhutan. It is important that RGOB nurtures this market by encouraging RBHSL to expand the same till the year 2020. The market size and opportunity should be reviewed in the year 2020 and thereafter a case for private sector

participation may be established. It is important that for helicopter services to grow, government should identify select helipad locations where fueling facility is provided.

- Development of second international airport

As explained in the previous section, Paro is one of the world's most challenging airports. The extreme weather conditions limit the operating window of the airport. There are instances where flights get diverted to alternate airports due to difficulties in landing in such conditions. Since the supporting infrastructure including fueling facility is not available at other domestic airports in Bhutan, flights often get diverted to the neighboring country. This issue along with the skewed growth of tourism on the western side is an additional factor which makes a case for development of a second gateway into Bhutan. Technical studies can be undertaken to establish if Gelephu or Bumthang qualifies for the same.

- Aviation Safety & Security

Bhutan joined the ICAO in 1989. The responsibility of an ICAO Contracting State like Bhutan and 188 others for providing facilities and services to enhance the safety, regularity and efficiency of civil air transport within its territory, is implicit in its acceptance of the International Standards to which the Chicago Convention of 1944 refer.

In order to discharge its responsibilities, an ICAO Contracting State should ensure compliance, not only enact and keep its aviation legislation current, providing for development and promulgation of a code of regulation and practices consistent with the Annexes to the Convention.

As per Annex 19 to Chicago Convention, Bhutan needs to develop a State Safety Program. Through the SSP platform, Bhutan can apply the two basic safety management principles within DoAT & BCAA.

- Safety Risk Management (SRM)
- Safety Assurance (SA)

Through this framework, Bhutan will allow the BCAA and service providers to interact more effectively in the resolution of safety concerns. The SSP framework has four components:

- 1 State safety policy and objectives
 - State safety legislative framework
 - State safety responsibilities and accountabilities
 - Accident and incident investigation
 - Enforcement policy
- 2 State safety risk management
 - Safety requirements for service providers SMS
 - Agreement on service providers safety performance
- 3 State safety assurance
 - Safety oversight
 - Safety data collection, analysis and exchange
 - Safety data driven targeting of oversight on areas of greater concern or need
- 4 State safety promotion

- Internal training, communication and dissemination of safety information
- External training, communication and dissemination of safety information

Based on the formulated SSP, the service providers Druk Air & Tashi Air can implement the safety management system acceptable to the State through which:

- Safety hazards are identified;
 - Implementation of remedial action necessary to maintain agreed safety performance is ensured;
 - Continuous monitoring and regular assessment of the safety performance is provided; and
 - There is an aim for continuous improvement of the overall performance of the safety management system
- Improvement in Air Navigation Services

ADB has pointed out in its air sector assessment reports that Bhutan's air navigation and surveillance equipment's are inadequate and need improvements.

Space based navigation has emerged as a forerunner in providing position, velocity and timing services with the advent of various global navigation satellite systems. Satellite-Based Augmentation Systems (SBAS) that improve the quality of service provided by GNSS are expected to replace a significant number of ground-based navigation systems and allow for more efficient use of available airspace. Recognizing the potential benefits of such systems, India took the early initiative and realized its own SBAS called GAGAN-GPS Aided GEO Augmented Navigation-over the Indian region. With GAGAN, India became fourth nation to offer satellite-based augmentation system to aviation sector.

GAGAN provides a civil aeronautical navigation signal consistent with International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs) as established by the Global Navigation Satellite System (GNSS) panel. GAGAN is ICAO compliant and interoperable with aircrafts equipped with other international SBAS systems such as the U.S. Wide Area Augmentation System (WAAS), the European Geostationary Navigation Overlay Service (EGNOS), and the Japanese MTSAT Satellite Augmentation System (MSAS) and provides seamless air navigation across regional boundaries.

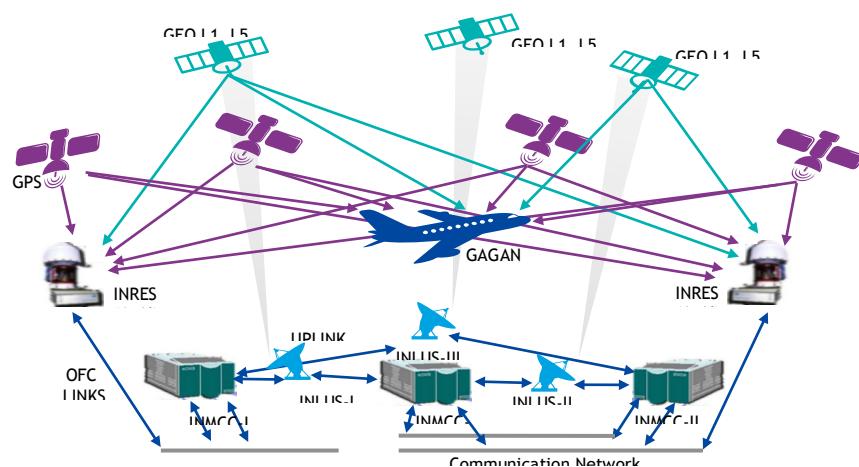


Figure 66: GPS Aided GEO Augmented Navigation (GAGAN) Architecture
 Source: ISRO Website

GAGAN geo footprint extends from Africa to Australia and has expansion capability for providing seamless navigation signal accuracy in the larger region neighboring India up to 1500 nautical miles. GAGAN signals are available from Africa to Australia through two GEO satellites GSAT-8 and GSAT-10. Third GEO satellite GSAT-15 is intended to serve as a backup to GSAT-8 and GSAT-10 satellites. GAGAN system has capability to cater up to 45 reference stations at strategic locations within the region.

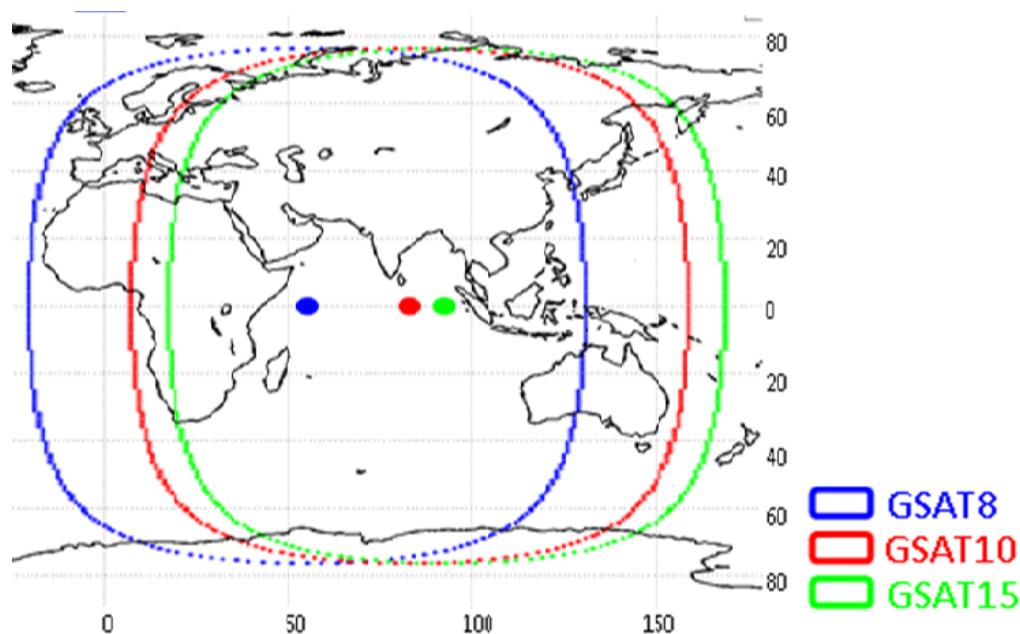


Figure 67: GAGAN Geo Footprint
 Source: Airports Authority of India (AAI)

There are multiple benefits of implementing GAGAN in aviation sector. The main benefits are:

1. Significant cost savings: Being a satellite navigation system, the aircrafts will work through GPS aided navigation after installation of GAGAN. This will lead to withdrawal and non-requirement of ground navigational aids. This will lead to huge cost savings in the overall system.
2. Improved efficiency: The satellite navigation system will significantly enhance efficiency by enabling usage of shortest possible direct routes between two points. This will lead to huge fuel savings and shorter turnaround time for aircrafts.
3. Reduced workload: The satellite navigation system will reduce the workload of flight crew and air traffic controllers.
4. Optimum air space utilization: GAGAN will lead to improved capacity through reduced airspace separation.

5. Enhanced safety: GAGAN will lead to higher accuracy of aircraft control and navigation systems. This will also significantly enhance the global coverage area.
6. Compatibility with non-aviation receivers: GAGAN is compatible with other non-aviation receivers in sectors such as Roads, Railways, Maritime, Agriculture, etc.
7. Ease in rescue operations: Due to its enhanced visibility and coverage, the system is easy to track in case of search and rescue operations.
8. Reduced noise pollution: The noise pollution footprint of GAGAN's "satellite based" system is significantly less than the "land based" system.

There are multiple benefits of GAGAN in non-aviation sector. The main benefits are:

1. Agriculture: GAGAN has wide applicability in Agro Industry. The target user community is much broader than just farmers and includes the agribusiness chain. Some of the potential applications are:

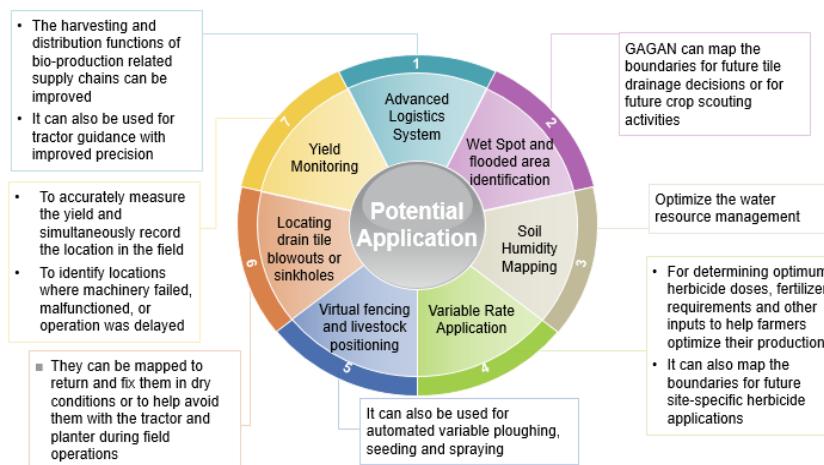


Figure 68:

Applicability of GAGAN in agro-industry
Source: Airports Authority of India (AAI)

2. Disaster Management: GAGAN models and simulation systems will enable decision-makers to both exercise response and recovery plans during disaster times and also understand near real-time possibilities during an event. Search and Rescue (SAR) system for the location of isolated victims in the case of natural or man-made disasters by establishing an effective and reliable communication link between vehicles and the ground station can be designed. Rapid damage assessments and identification of safe locations and zones for rehabilitation would be possible with the help of GAGAN. Remotely sensed data can be used very effectively for quickly assessing severity and impact of damage.

3. Road Transport:

- Smart mobility applications: Smart mobility devices improve the efficiency, effectiveness and comfort of the road transportation. Portable Navigation Devices (PNDs) and In-Vehicle Systems (IVS) provide turn by turn information to drivers. GAGAN has a huge potential in this application of GNSS. Accurate information through GAGAN will also generate lane-wise traffic data which will be useful for better route planning.

- Safety critical applications: In situations posing potential harm to humans, damage to systems/ environment, GNSS & SBAS technology can prove beneficial and potentially lifesaving. Connected vehicles will benefit from the accurate position technology such as SBAS to constantly monitor its accurate relative position with respect to other vehicles and structures nearby.
- Liability and payment applications: Use of SBAS and GNSS can enhance accuracy, effectiveness and control of authorities. Insurance companies can improve fairness of motor insurance for both insurer and subscriber by analysing GNSS based data in a particular area. Data collected through SBAS Systems can be used by insurance companies to classify areas and can differentially price people living in the vicinity of black-spot areas. Additionally, GAGAN enabled chips being a safety equipment, insurance companies can offer discounts to customers having such technology in their vehicles.
- Regulatory applications: Using GNSS/SBAS technologies, the authorities can easily enforce rules and regulations. GNSS/SBAS enabled IVS can be used to call-in for support in case of emergency and will ensure quick response through accurate location. Smart digital tachographs leverage GNSS position to support road enforcers. It can also be used by cab aggregators for enforcing regulations related to speed or distance.

4. Telecom Sector:

- Timing and Synchronization: The timing and synchronization is based on atomic clocks which are placed in multiple locations across the globe. GNSS technology is used when the satellite synchronization between these clocks is not available and Local oscillators are used when GNSS signals are not available. Hence the entire system heavily relies on integrity of the GNSS technology. Since GAGAN offers better integrity over GNSS, it is important that we employ the best available technology.
- Accuracy of Financial Infrastructure: Financial markets infrastructure (such as stock exchanges) rely on above mentioned timing mechanism for putting time stamps on continuous transactions. Advent in technology has resulted in high-speed trading which is affected by minor time lags. SBAS technology offers improvement which can potentially improve the accuracy of the system making it more sophisticated.

GAGAN technology can be incorporated by Bhutan for space based navigation in its aircrafts. GAGAN enables enhanced safety and significant cost savings. It would be worthwhile to explore this technology for Bhutan. A detailed feasibility studies can be carried out to assess the performance and cost benefit analysis of GAGAN in case of Bhutan. Based on the results of DFR, a case for GAGAN implementation can be established.

▪ Sustainable aviation

The industry's collective efforts at reducing emissions are spearheaded by ICAO and IATA, though the European Union has perhaps made the largest efforts of any individual jurisdiction. IATA has proposed that new technologies must be deployed to yield more efficient engines and aircraft, and better fuels. Second, operational practices like weight-

reduction measures and more efficient flight procedures and air-traffic control should be researched and adopted widely. Third, better airport infrastructure (for example in terms of its siting, layout, and design) could result in reduced low-altitude emissions. Finally, market measures like carbon offset programmes, cap and trade programmes, and others should be developed and adopted. Having ratified the United Nations Framework Convention on Climate Change (UNFCCC) and its Paris agreement, Bhutan needs to pursue on the above recommendations of IATA to limit its contribution to the GHG emissions.

- Capacity Building

Stakeholders across the board have acknowledged the importance of capacity building in the aviation sector. Structured capacity building programmes are required to be conducted on a period basis for improving the capacities of not just the DoAT or BCAA but also for pilots, engineers, ground handling staff, etc.

To address these needs, technical partnerships with world agencies such as the ADB need to be further deepened. Further, Bhutan should enter into a partnership with India for national aviation university. The university is an apex institution to promote aviation studies, training and research in order to cater to the growing demand of skilled professionals in aviation sector in India. Established under an act, the university provides academic alliances, industry alliances, research focus, skilled faculty and quality infrastructure with a rigorous curricula. Bhutan can either explore associating with the university to or alternately establish a satellite campus in Bhutan which brings the advantage of aligning the training programs in accordance to the needs of the industry. The value proposition of the industry is provided in the figure below. Preliminary discussions with the NAU indicate that they are amenable for developing a satellite campus within Bhutan.

AVIATION INDUSTRY	REGULATORS & POLICY MAKERS	RESEARCH & TRAINING INSTITUTIONS
<ul style="list-style-type: none"> ▪ Ensure relevance of the programs based on industry needs ▪ Ensure employment readiness of the students ▪ Provide pathways for academic progression of the professionals 	<ul style="list-style-type: none"> ▪ Be a knowledge partner for the regulator ▪ Provide advocacy support to the regulator ▪ Provide assistance to the regulator in setting up academic standards for the professionals 	<ul style="list-style-type: none"> ▪ Promote education, training and research in multiple disciplines within aviation sector ▪ Follow international standards and best practices ▪ Promote research and development activities

Figure 69: Value proposition of an aviation university

Source: KPMG Analysis

Chapter 6: Regional Connectivity

The eastern South Asia comprising of Bangladesh, Bhutan, Northeast India and Nepal is a densely populated sub-region sharing the common border, culture and social values. However, the transport infrastructure has been disconnected and thick borders has impeded the economic growth and common welfare of the people across the sub-region. Good bilateral relations underpin regionalism. In this respect the narrative is changing for the better in the region. Since SAARC faces political and strategic constraints, which prevent the collective pursuit of the development imperative by member countries, alternative mechanisms have been developed. Bay of Bengal Initiative for Multi-sectoral Technical and Economic Cooperation (BIMSTEC) is one such effort. South Asia Sub-regional Economic Cooperation (SASEC) is another such project led initiative which focuses on 3 sectors - transport, trade facilitation and energy. BBIN is a sub-set of SASEC. The three subgroupings share the common aspiration for an integrated and prosperous Asia.

Three main drivers of deeper cooperation are:

- a) Economic forces (markets, growth, investment, economic policy etc.)
- b) Political forces (trust, institutional arrangements viz. governmental initiatives by commerce ministries, utilisation of regional public goods, private sector involvement, etc.)
- c) Extra-regional forces (global economic change, rules and arrangements)

BBIN's intra-regional trade of around US\$ 10 bn is just 3.4% of BBIN's global trade. In contrast, ASEAN's intra-regional trade is around 25%. BBIN trade potential is estimated to be US\$ 50 bn and a substantial part of this potential has been unrealized due mainly to presence of large barriers to trade.

Indeed, the capacity to deliver goods and services in time and at a low cost is the basis for export competitiveness. A reduction of transaction costs for international trade is as important as a reduction of traditional trade restrictions such as tariffs and fees. An increased awareness of these trade-related, cross border transactions costs has called for efforts, under the heading of "trade facilitation", by international organizations such as the WTO and World Customs Organization. The main objective of trade facilitation is to streamline the movement of goods through border check points and minimize the custom documentation requirements. More precisely, the European Commission defines trade facilitation as the simplification and harmonization of international trade procedures, including import and export procedures. These procedures include "the activities (practices and formalities) involved in collecting, presenting, communicating and processing the data required for the movement of goods in international trade"⁵⁰.

⁵⁰ European Commission 2014

Tourism is one of the world's largest and fastest growing sectors, accounting for almost 11% of global gross domestic product and more than 8% of global employment (one in every 12 jobs). The World Tourism Organization forecasts that the number of international tourist arrivals will reach 1.6 billion by 2020, spending a total of \$2 trillion per year.

Both trade and tourism play an important role for Bhutanese economy. For seamless connectivity in the region, there should be a better understanding of its economic geography among the policy makers, politicians and other stakeholders. This chapter presents an assessment of Bhutan's trade with its neighboring countries, the framework which facilitates such trade and the concerning issues. Based on the issue appraisal, appropriate policy interventions have been suggested.

6.1 “As-Is” Assessment

- Bhutan's trade analysis

Bhutan has moved from a virtually closed economy in 1960 to an economy characterized by a fair degree of openness. The share of trade, as of 2015, is approximately 78% of the GDP. Cross-border trade transactions fall into two categories: trade with India, which forms the largest EXIM market and trade with third countries other than India. Third country imports are regulated by the Rules and Procedures for Imports from Third Countries (2002) issued by the Department of Trade, Ministry of Economic Affairs.

The top 5 Import & Export partners for Bhutan and the value of trade (in Million Nu) are presented in graphs below. As can be observed, India, being the biggest trade partner for Bhutan, accounts for 78% of its Imports and 85% of its exports.

Top 5 Exports Partners for Bhutan 2015 (Value in Nu.Mn)

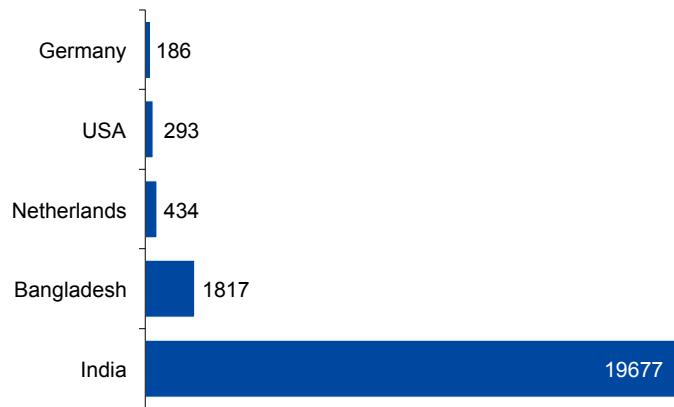


Figure 70: Top 5 Export Partners of Bhutan

Source: Statistical Yearbook of Bhutan 2016, National Statistics Bureau Bhutan

Top 5 Imports Partners for Bhutan (Value in Nu.Mn)

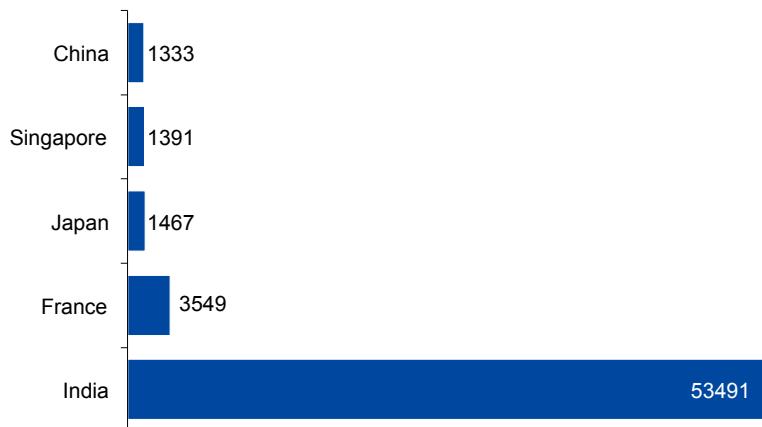


Figure 71: Top 5 Import Partners of Bhutan

Source: Statistical Yearbook of Bhutan 2016, National Statistics Bureau Bhutan

While there has been free trade between the territories of the Governments of India and Bhutan since the Indo-Bhutan Friendship Treaty of 1949, a formal agreement known as the Agreement on Trade, Commerce and Transit between Bhutan and India was signed in 1972 and subsequently renegotiated in 2006. Under the agreement, Trade with India is duty free. Bhutan also enjoys transit rights through India for trade with third countries through this agreement. The provisions of this agreements as well as the use of Indian rupee in trade and the fixed exchange rate between the two national currencies facilitate trade between the two countries.

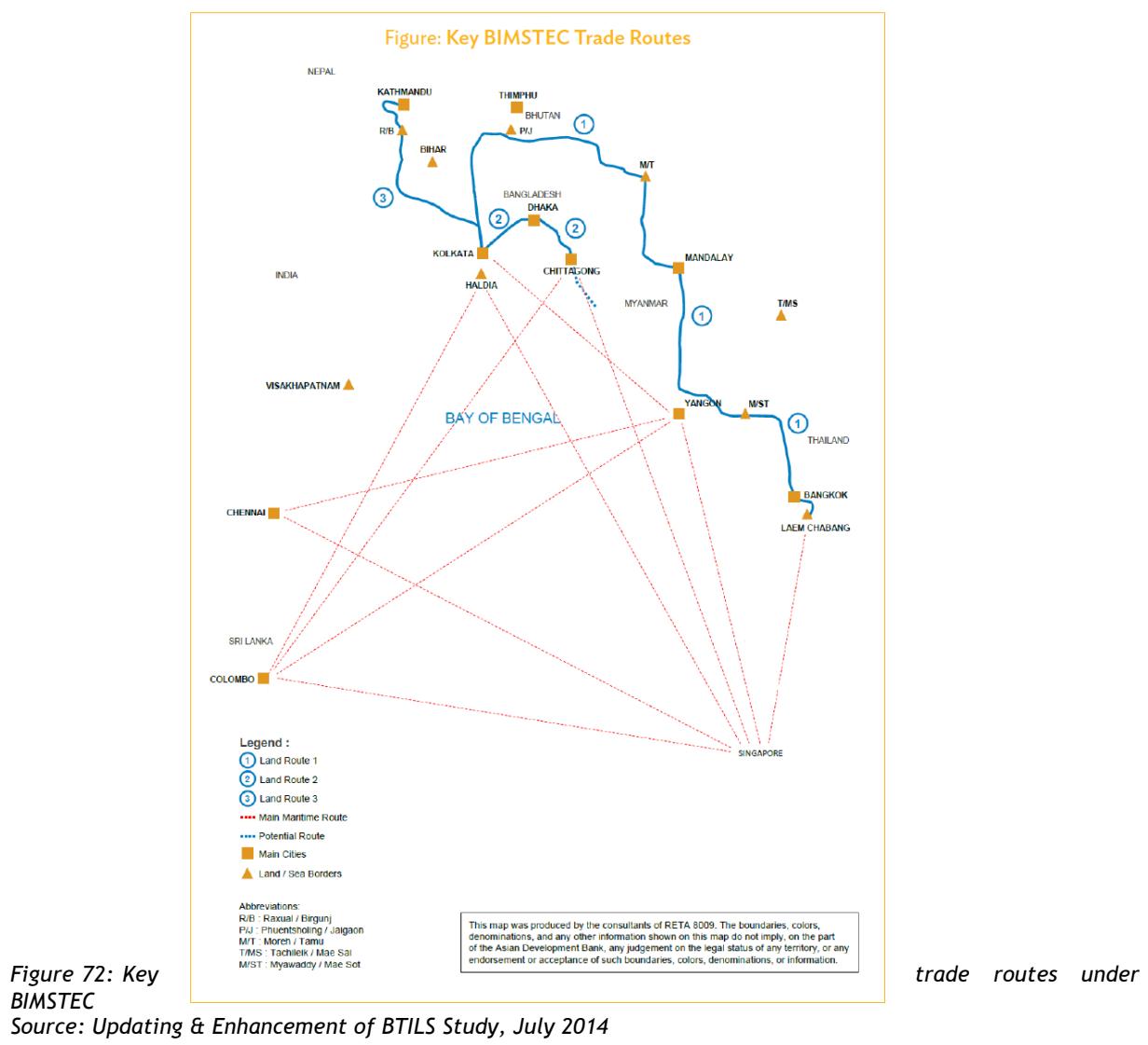
Trade with Bangladesh - conducted within the framework of a preferential trade agreement originally signed in 1980 - started only from 1988 after transit rights had been negotiated with India. Bangladesh and Bhutan renewed the bilateral trade agreement in 2003, granting each other MFN status. The protocol attached to this bilateral trade agreement defines Burimari (Bangladesh)–Changrabandha (India)–Jaigaon (India)– Phuentsholing (Bhutan) as the transit route for bilateral trade between Bangladesh and Bhutan. The trade agreement was renewed subsequently in 2009. Key provisions in the agreement relate to the opening of a new trade route in eastern Bhutan and an increase in the number of commodities, which will receive duty-free treatment in both countries.

Bhutan is also a member of two regional cooperation groupings: SAARC and BIMSTEC. Bhutan is a founding member of SAARC and has negotiated three trade agreements under its umbrella: the Agreement on SAARC Preferential Trading Arrangement (SAPTA); the Agreement on South Asian Free Trade Area (SAFTA); and the SAARC Agreement on Trade in Services (SATIS).

SAPTA, which was signed in 1993 and became operational in 1995, is focused on preferential tariff reduction. SAFTA was primarily envisaged as the first step towards the

transition towards a customs union, common market and economic union. The agreement was signed in 2004 and came into effect in 2006. Since the agreements did not cover trade in services, in 2010, SATIS was executed to establish a framework for promoting and liberalizing trade in services.

BIMSTEC is a regional economic grouping under which members will progressively reduce and ultimately eliminate tariffs and non-tariff barriers for virtually all goods. The grouping further promotes progressive liberalization of trade in services and an open and competitive investment regime to promote foreign direct investment. Liberalization of trade in goods is based on the negative list, while service is on the positive list. Key trade routes promoted under BIMSTEC is shown in the map below.



- Status of physical infrastructure on border crossing points in Bhutan
- As a landlocked country, trade happens primarily via road route connected through India. The country's main border check post is located in Phuentsholing, a city located on the

border and essentially an extension of its neighboring Indian city of Jaigaon. Phuentsholing is located at distance of 168 Kms from Thimphu, the national capital. It takes nearly 6 hours to cover this distance.

Other smaller, less active border check points are Samtse and Gelephu. The location of the check points in Bhutan sharing border with India are represented in the figure below.



Figure 73: Major Land Custom station in Bhutan sharing borders with India

Source: Map by RGOB

Total trade occurring in Bhutan is divided across 6 regions. This regions and their percentage of total trade (in Nu) is presented in the table below:

Region/Checkpost	Export to India	Export to Other Countries	Import from India	Import from other countries
Gelephu Region	3.39%	4.99%	7.52%	0.10%
Gelephu Gate	3.39%	4.99%	7.52%	0.00%
Gelephu Region	0.00%	0.00%	0.00%	0.10%
Paro Region	0.00%	4.23%	0.91%	15.74%
Paro Airport Cargo	0.00%	0.74%	0.88%	15.01%
Terminal	0.00%	34.87%	0.04%	0.73%
Phuentsholing Region	64.21%	64.25%	80.13%	81.85%
Lhamoi Zingkha	0.08%	0.00%	0.01%	0.00%
Phuentsholing Gate	64.13%	64.25%	80.12%	0.00%
Phuentsholing Region	0.00%	0.00%	0.00%	81.85%
Samdrup Jongkhar Region	11.17%	6.85%	7.80%	0.44%
Daifam	0.02%	0.00%	0.02%	0.00%
Phuntshok Rabtenling Gate	4.81%	0.00%	0.68%	0.00%
Rinchenthang Gate	4.31%	0.35%	2.04%	0.00%
Samdrup Jongkhar Gate	2.03%	6.50%	5.06%	0.00%
Samdrup Jongkhar Region	0.00%	0.00%	0.00%	0.44%
Samtse Region	21.22%	18.45%	3.57%	0.00%
Bhimtar	0.06%	0.00%	0.06%	0.00%
Bindoo	0.38%	0.00%	0.00%	0.00%

Region/Checkpost	Export to India	Export to Other Countries	Import from India	Import from other countries
Gomtu	9.43%	5.89%	1.61%	0.00%
Jitty	1.80%	0.30%	0.09%	0.00%
Pugli	8.01%	7.35%	0.12%	0.00%
Samtse Gate	1.30%	1.97%	1.65%	0.00%
Sipsoo	0.01%	0.00%	0.00%	0.00%
Trashijong	0.23%	2.95%	0.04%	0.00%
Thimphu Region	0.00%	1.23%	0.07%	1.87%
Thimphu Transit	0.00%	1.23%	0.07%	1.87%

Table 17: Share of trade from each border crossing point

Source: Bhutan Trade Statistics 2016, Department of Revenue & Customs, Ministry of Finance

Phuentsholing region has got the maximum trade flowing through it. It accounts for 76% of the total trade (64% of overall exports and 80% of overall imports). Samtse and Samdrup Jongkhar region have 8 and 5 active check points respectively. Despite the high number of check-points, the region other than Phuentsholing handle insignificant volume of trade.

The border facilities cannot accommodate the flow, and the border towns suffer from traffic congestion as a result. As per ADB's assessment, vehicles carrying materials and products to and from the Pasakha industrial estate, located 15 km east of Phuentsholing, account for 30% of the cross-border traffic in Phuentsholing city. Direct access between India and Pasakha, a bypass road, and a small dry port in Phuentsholing are however being developed to facilitate the movement of this freight and improve Bhutan's trade competitiveness. This along with a mini dry port at Phuentsholing are being developed under SASEC initiative of ADB.

To gauge the level of preparedness of a country to facilitate logistics, World Bank publishes an index on Logistics Performance. The index is a weighted average of the country's score on six key dimensions: (i) efficiency of the clearance process; (ii) quality of trade and transport-related infrastructure; (iii) ease of arranging competitively priced shipments; (iv) competence and quality of logistics services; (v) ability to track and trace consignments; and (vi) timeliness of shipments. The scorecards demonstrate comparative performance ranging from 1 (lowest score) to 5 (highest score). The index for year 2016, places Bhutan at 135 with a score of 2.32 out of 5. In comparison Bangladesh scores 2.66 Mongolia 2.51 and India 3.42. Moreover Bhutan's score in 2012 was 2.52, in four years there has been a decline of 0.2. A comparison of Bhutan's logistic performance against South Asia is presented in the graph below which indicates that Bhutan lags behind the South Asia average on all the parameters.

World Bank Logistics Performance Index

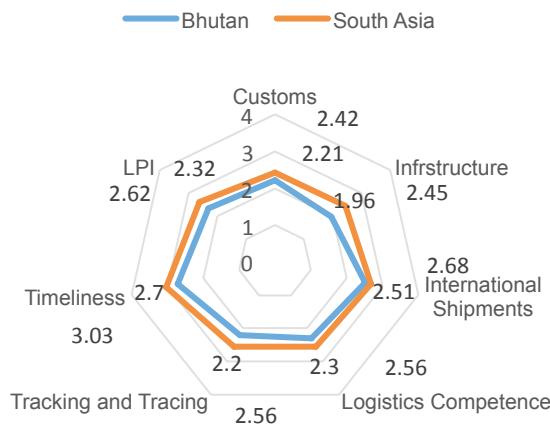


Figure 74: Logistics performance index comparison of Bhutan vis-à-vis South Asia

Source: World Bank report

The performance trend of Bhutan on various evaluation parameters relating to logistics is presented in the table below.

Year	Overall LPI	Customs	Infrastructure	Ease of Shipment	Logistics	Tracking	Timeliness
2016	2.32	2.21	1.96	2.50	2.30	2.20	2.70
2014	2.29	2.09	2.18	2.38	2.48	2.28	2.28
2012	2.52	2.29	2.29	2.61	2.42	2.56	2.90
2010	2.38	2.14	1.83	2.44	2.24	2.54	2.99
2007	2.16	1.95	1.95	2.06	2.18	2.27	2.57

Table 18: Share of trade from each border crossing point

Source: World Bank report

Factors like Customs and Ease of Shipment have shown an improvement over this period. Improvement was seen in the infrastructure score in 2012 but it has been reversed since then and now it is at approximately same level as it was in 2007. Similarly tracking scores improved during the surveys in 2010 and 2012, but in 2016 they are at levels below that of 2007. The overall LPI ranking of Bhutan has dropped by 7 places in this period i.e. from 128 to 135.

- Facilitating Regional Connectivity: International Conventions & Sub-regional transport agreements

Regional connectivity can be facilitated through agreements between countries. These agreements fall into two categories - International Conventions and Sub-regional Agreements. The nature of these agreements, methodology of implementation, their advantages & disadvantages are discussed in subsequent paragraphs.

International Conventions

There are a number of international conventions that govern transport. UNESCAP issued Resolution 48/11 in 1992, which recommended seven key international conventions. These conventions include Convention and Statute on Freedom of Transit and various conventions on road traffic, road signs and signals. The international conventions set standards to

facilitate the harmonization of transport laws & regulations and the adaptation of unified transport documents for regional transit and/or inter-state transport. More importantly, these international conventions help the streamlining of border- crossing formalities and procedures, including visa procedures for professional drivers, in order to reduce delivery time and transport costs. However, the conventions are difficult to implement at the country level for several reasons, including high cost of adjustment to meet the requirements; and lack of institutional structures at the country level. Given these issues the countries in South Asia have been slow to accede to important international conventions on transport.

The status of accession of South Asian countries to this conventions is presented in the table below:

Countries	Afghanistan	Bangladesh	Bhutan	China	India	Nepal	Pakistan
Convention on Road Traffic	x	/	x	x	/	x	/
Convention on Road Signs and Signals	x	x	x	x	/	x	/
Customs Convention on the International Transport of Goods under Cover of TIR Carnets	/	x	x	/	x	x	/
Customs Convention on the Temporary Importation of Commercial Road Vehicles	/	x	x	x	x	x	x
Customs Convention on Containers	x	x	x	/	x	x	x
International Convention on the Harmonization of Frontier Controls of Goods	x	x	x	x	x	x	x
Convention on the Contract for the International Carriage of Goods by Road (CMR)	x	x	x	x	x	x	x

Table 19: Status of accession of South Asian countries to various conventions

Source: KPMG research

Sub-regional Transport Agreements: Given the difficulties in implementing the international conventions, some sub-regional transport facilitation agreements have been formulated. The advantages of these sub-regional transport agreements are threefold. One, they play an important role in opening up regional road traffic, promoting international conventions, harmonizing and simplifying formalities and procedures of bilateral transport agreements, and establishing standards not covered by international conventions. Two, the sub-regional transport agreements also can greatly facilitate trade as most of them have built-in trade facilitation measures. And three, sub-regional transport agreements can be a powerful showcase politically for regional cooperation and integration.

The disadvantage of sub-regional transport agreements is that they often take years to conclude the negotiations and particularly to complete the legal process domestically for entry into force. The implementation of these agreements at the country level is also facing complicated coordination issues as it involves many government ministries and authorities. Most of these agreements are under the purview of transport and thus customs authorities are not always active in implementing these agreements. Most importantly as

these agreements often require reforms and adjustment of domestic legislations, many of them were signed but never been fully ratified.

BBIN Initiative

The Bangladesh, Bhutan, India, Nepal (BBIN) sub-regional initiative is envisioned to improve economic cooperation and connectivity among the four South Asian countries. The first achievement of the BBIN initiative has been the Motor Vehicles Agreement (MVA), signed on 15 June 2015 in Thimphu, Bhutan. The MVA looks at easing passenger, personal and cargo movement among the BBIN countries. It has been developed with the support of the ADB under its SASEC programme. BBIN MVA intends to allow the BBIN countries to move forward with implementation of land transport facilitation arrangements between and among them, enable the exchange of traffic rights and ease cross-border movement of goods, vehicles and people, thereby helping to expand people-to-people contact, trade and economic exchanges between them. The BBIN MVA is expected to make cross border trade and transport in and through the Northeastern region of India to and from Bangladesh, Bhutan and Nepal more efficient.

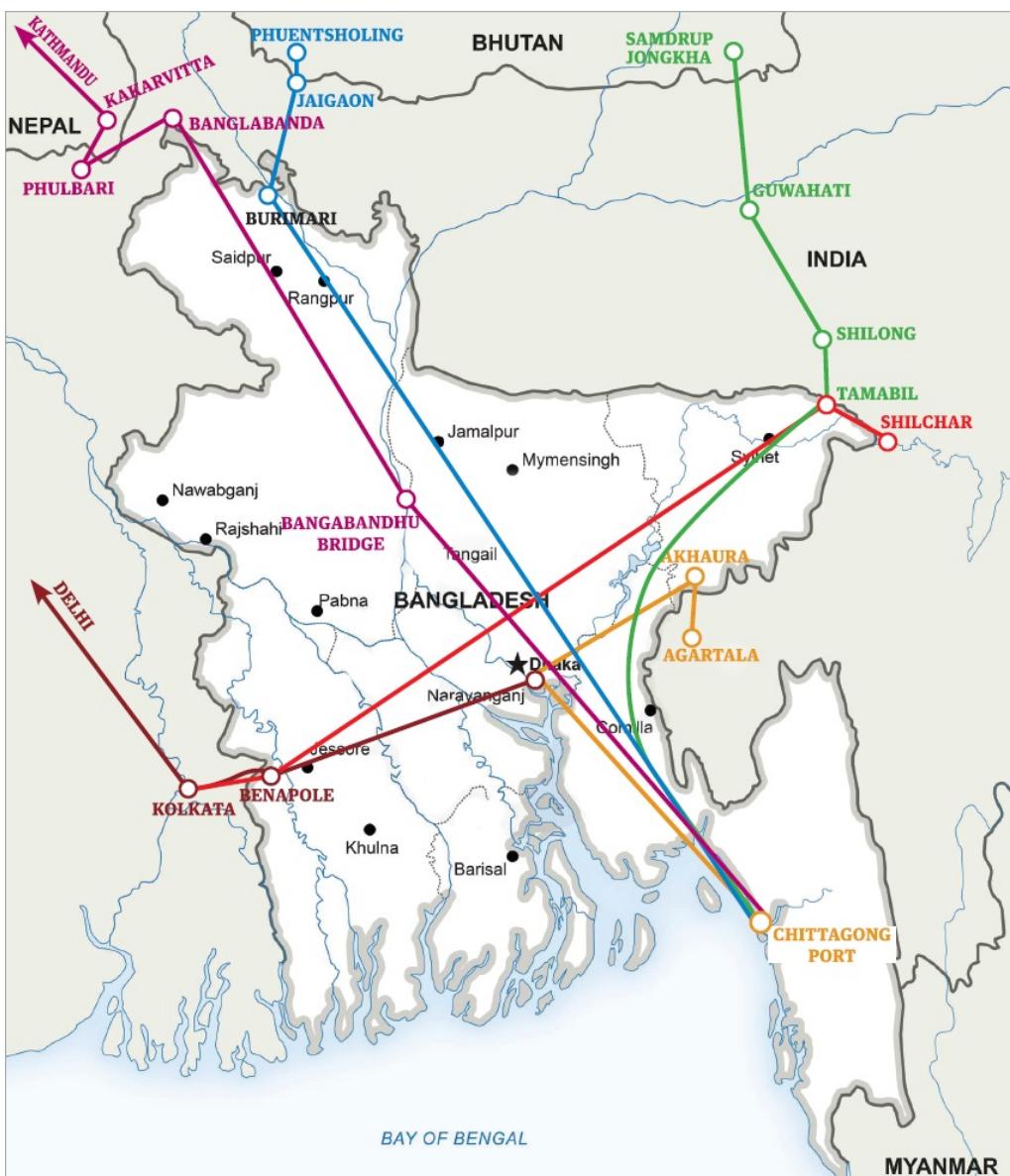


Figure 75: BBIN proposed route map

Source: Secondary research

The BBIN MVA has seventeen articles with three annexures. The following are some of the important components of the MVA: Only ‘authorized operators’ will be permitted for passenger and cargo transport; operators cannot carry passengers within another country; multiple entry permits will be issued which will be valid for one year; installation of tracking systems; and refers to the necessity of operationalizing international road signs/signals on the specified routes.

Besides the motor vehicle agreement, BBIN is also exploring formulation of a rail agreement.

6.2 Challenges in regional connectivity

- Excessive dependence via single Border Crossing Point

Phuentsholing is the busiest BCP, carrying 40% of passenger vehicles, 55% of the trucks and 28% of buses crossing Bhutan and India every day. In 2015, Phuentsholing handled 67% exports and 75% of imports. The Phuentsholing BCP can barely handle this volume and this is evident by the fact that this border crossing point is infested with traffic congestion and delays in cargo clearance.

Phuentsholing BCP route also provides access to Bhutan to tourists and people of both India and Bhutan. Bhutanese nationals who intend to travel to south eastern parts of Bhutan prefer to take this route to enter India and travel via Assam as internal road connectivity to Samdrup Jongkhar, Pemagatshel, Monggar, Sarpang and Tshirang is inadequate. Moreover, goods traffic through this route is unnecessarily delayed as it is escorted by India customs. The Southern East West Highway, once constructed is expected to reduce the distance as well as time of travel. Thus there is undue dependence on Phuentsholing BCP and need for opening/ upgrading additional/ existing border crossing points. Rehabilitation and improvement of the Southern North West road is critical for success of planned economic industrial zones Samtse, Gelephu and Samdrup Jongkhar⁵¹.

- Lack of critical physical infrastructure at Phuentsholing Land Customs Station

The key findings related to infrastructure and related facilities at Phuentsholing LCS in Bhutan is presented in the table below:

Key Aspects	Key findings related to infrastructure and other facilities
Infrastructure/ facilities	<ul style="list-style-type: none"> • While the LCS has infrastructure in terms of truck terminal

⁵¹ 11th Five year plan 2013-18

Key Aspects for handling Containerized cargo	Key findings related to infrastructure and other facilities facility, inspection shed, etc., it is inadequate for handling existing cargo traffic. Also, there is absence of basic facilities like weighbridge, warehouse along with facilities for handling containerized cargo like container platform, container stacking yard, reefer points, etc. at the LCS
Availability of inland facilities like dry ports/ bonded warehouses, etc.	<ul style="list-style-type: none"> LCS is not equipped with equipment like reach stackers, cranes (gantry crane/ hydra crane), forklifts, lift trucks, etc. for handling containerized cargo. In case such equipment are required, these are hired on a rental basis from private players located in vicinity. Also, there is absence of inspection equipment like container scanners at the LCS. In terms of other related infrastructure, the existing condition of the paved roads within the LCS is not good. Also, the turnaround radius is inadequate to facilitate smooth movement of large cargo vehicles at the LCS.
Infrastructure in terms of conditions of roads, bridges in vicinity	<ul style="list-style-type: none"> Currently, there is absence of any inland facilities like dry ports/ bonded warehouses inside Bhutan. However, there are two mini dry ports, proposed to be set up under the ADB funding at (a) Phuentsholing and (b) Rinchending near Pasakha Industrial Area.
Customs Automation, ICT connectivity with Inland Customs Stations and associated capacity building requirements	<ul style="list-style-type: none"> The road connecting Pasakha Industrial Area to Phuentsholing LCS is congested and not in good condition for movement of large cargo vehicles including trailers Customs processes are automated at the LCS. While BACS (Bhutan Automated Customs System) is presently used as the Customs data software, the system is migrating to RAMIS (Revenue Administration Management Information System) which is expected to be rolled out shortly. The new automated system provides for (a) online filing of documents, (b) exchange of electronic data between Customs and other stakeholders, (c) monitoring and tracking of the status of documents filed and payment of duties and taxes, (d) assessment of duty along with verification, validation and accounting of customs declarations, etc. There exists ICT connectivity with other customs stations for exchange of customs related information including quantity of goods imported/ exported, duty levied, revenue collection, etc. While training has been provided by the Department for rolling out RAMIS, there is a need felt for further capacity building to the customs officials to ensure seamless migration to the new automated customs system.

Table 20: Status of physical infrastructure at Phuentsholing LCS

Source: ADB

- Absence of rail linkage at till Border Crossing Point as well as within Bhutan
Bhutan predominantly trades through road mode only. With increase in trade volumes, it is desirable to provide rail linkages between Bhutan's BCP and India's nearest rail head. Detailed feasibility study of a 17 km link between Hashimara and Phuentsholing was undertaken where it was concluded that construction may not be financially justifiable. It

is understood that detailed feasibility studies for other points such as Kokrajar to Gelephu, Pathsala to Nganglam, Rangia to Samdrup Jongkhar and Banarhat to Samtse is underway⁵². Large projects such as these though are not financially feasible but still require its development based on economic merits of faster transport, reduction in road congestion, undue dependence on one mode of transport, eliminating need for double handling, elimination of revenue leakages, fuel efficiency, less pollution and lower environment degradation. Such projects may be evaluated on economic internal rate of return which also considers social and environment impacts of the project instead of basing the decision only on financial returns.

- Issues relating to BBIN

While BBIN has been widely accepted amongst the stakeholder countries as a right step towards integration of regional economies, there are several challenges in way of enhancing the transit transport cooperation. The inadequacy of the physical infrastructures and missing links is not the only issue. Development of the appropriate physical infrastructures need to be supplemented by the development of soft infrastructures like simplification and harmonization of the customs and border procedures and regulatory requirements, conclusion of sub-regional transit and rail services agreement, promotion of intermodal competition of transport businesses, application of electronic data interchange (EDI) and ICT in clearances of transport vehicles and cargo in transit.

In May 2017, Bhutan government opted out of the BBIN MVA sighting a series of concerns. The Legislative Committee of the Nation Council of Bhutan had constituted a 6 member committee to review the BBIN MVA. The committee submitted its report in October 2016. Further, the Legislative Committee interacted with various stakeholders including National Assembly Members, MoIC, RSTA, Ministry of Foreign Affairs, Taxi Associations, BCCI, TCB, Association of Bhutanese Tour Operators among others. The committee summarized its observations and had certain reservations about the BBIN MVA. Some of them being:

- Lack of impact assessment of the MVA on domestic laws as some of the provisions of the MVA contradict the provisions of prevailing domestic laws.
- Lack of a study to determine the impact of MVA on Bhutan's culture, tradition, environment, national security, political, economy, etc
- The MVA is based on the principle of reciprocity. The stakeholders have expressed concerns over Bhutan's disadvantage due to asymmetry in its size and population compared to the other three countries.
- The MVA states that it shall not affect the existing bilateral arrangements or agreements between the Contracting Parties. While the intention of the Agreement is to formalize existing informal arrangements, current problems faced by the Bhutanese vehicles plying in the bordering Indian States and the problems created by Indian vehicles plying within Bhutan cannot be addressed by the MVA.

Based on this and other observations Legislative Committee concluded that MVA will not generate significant and tangible benefits to Bhutan. Instead, it is rather likely to pose several risks in the immediate and long-term future. The concerns, risks and perceived

⁵² SASEC Operational Plan 2016-2025

threats need to be addressed through exhaustive stakeholders consultation, research studies and negotiations. The Committee said that the opportunity to address them exists owing to Bhutan's special and excellent relationship with other BBIN Members.

6.3 Policy interventions

Bhutan's connectivity with its neighbors needs to involve all modes of transportation, namely, land (including road and railways) and air. A multipoint approach is needed for improving the regional connectivity of Bhutan. The steps that can be taken up are summarized here:

- Strengthen additional Border Crossing Points

In view of the choked existing BCPs, new points must be developed. These points should have better infrastructure and equipment for faster custom clearance. In the short run, Bhutan should target diversifying trade to border points of Samtse, Gelephu and Samdrup Jongkhar. It is understood that Bhutan has also requested for additional border crossing points including Birpara, Dalmore, Bokajuli and Rangapani and seasonal trading points at Bhutan Ghat and Mathanguri. In the long run, sustained efforts should be made towards strengthening trade through these routes.

- Developing alternate modes of connectivity

Modal mix of trade is heavily skewed towards road. Even for person-to-person movement, roads and air transport are used to get connected to Bhutan. These modes have their limitation in terms of cost, speed, operational efficiency and impact on environment.

Presently the rail infrastructure does not exist in Bhutan. A reliable rail network could help in faster movement of goods and services and provide more options for tourists. A pre-feasibility study has been carried out to investigate potential options for Bhutan. This study⁵³ recommends the development of initial stage of Bhutan Rail in three stages as mentioned below. The report also evaluates the potential benefits of rail connectivity with India.

- a) Light Rail System in Thimphu City (running from North to South)
- b) Light Rail Link between Paro to Chuzom (to connect with the Thimphu - Phuentsholing Line)
- c) Heavy Rail Link between Thimphu and Phuentsholing

Since the proposed network is based on a pre-feasibility study, it needs to be followed up with detailed techno-economic studies. From a macro-perspective, it can be concluded that a shared network of railway between Bhutan, Bangladesh, India and Nepal can result in immense potential economic benefits.

⁵³ Pre-Feasibility Study to Investigate Potential Mass Transit Options for Bhutan, April 2017



From a larger regional agreement perspective, it is understood that there is already a draft rail agreement under SAARC, which could be modified and adopted for BBIN along with a clear time line.

Other than railways, waterways is also as an efficient and cost effective mode of transport for regional traffic, need to be developed. While various studies are being undertaken for establishment of feasibility of waterway network, Bhutan needs to closely observe the developments and undertake its share of studies to ascertain the economic benefits of this mode for the country. Based on preliminary assessment, the route for Bhutan would be via Dhubri, Daikhawa to Mongla/ Chittagong with the long-term possibility of linking all the way up to Bhutan through Manas/ Sunkosh Rivers.

- Further explore the impact of BBIN

Various policy experts in the region have identified a range of issues relating to BBIN. The biggest challenges in transit are weak infrastructure, lack of regulatory harmonization, no effective interaction process between cross border businesses, and lack of efficient coordination mechanisms between land port authorities, businesses and logistical companies. In order to improve transit cooperation, it is important to improve infrastructure and also maintain similar standards in all four countries to ensure seamless connectivity. Additionally, developing soft infrastructure and creating a secured electronic data management system, where data can be fed and shared by the four countries should be a priority to ensure hassle free transit without any threat to the security of the nations.

The concerns raised by various stakeholders within Bhutan are valid. It needs to negotiate issues in regional and sub-regional agreements carefully as sub-regional agreements such as BBIN is likely to make other regional agreement(s) redundant. However, the decision to accede to BBIN or international conventions such as Convention on Road Traffic, Convention on Road Signals & Signs, TIR Convention, etc require a more ‘balanced approach’ as they are not just mere connectivity enhancement initiatives but an effort to enhance peace stability, stability, prosperity and amity. It requires greater stakeholder involvement across the partners, countries and sub-region and beyond. Bhutan can undertake relevant impact assessment studies, carry out trial runs on the identified routes and accordingly define clearly the rules of its engagement under BBIN. Through this approach, it will be able to identify and implement quick impact projects.

Chapter 7: Governance structure

7.1 Introduction

Though governance is not the only factor on which the success of a transport system of a country depends, nonetheless, it is one of the most important considerations for an effective and efficient management. As per UNDP's view, good governance should be "participative, transparent and accountable".

The governance in transport sector can have a significant influence on how well any country's transport industry responds to market demands and national policy goals. Sector governance creates an enabling environment for the transport industry: the effectiveness of the government bodies with which it deals; the market freedoms that it is permitted; the regulatory constraints under which it operates; the confidence with which it can plan long term business initiatives and investments. World Bank's report "Transportation for Development" asserts that transport performance is not just a matter of physical investment. Transport that contributes positively to development and that is safe, clean and affordable also depends on sector governance.

7.2 Best practices observed with respect to governance structure

While the principles of good governance are universally applicable, the extent to which each country applies them is a function of the local condition and environment. For instance, governments differ on the extent of involvement of private sector or on level of involvement of local communities in decision making. However, there is an opportunity to learn from international experiences and customize it to suit the local environment.

Before explaining the governance structure followed in Bhutan, it is therefore important to undertake an institutional review of transport sector organization in select countries. World Bank has undertaken such assessment where institutional structure of five countries - Chile, Finland, Morocco, South Africa & South Korea, has been reviewed. The basis of selection of these countries has been a combination of factors: well managed systems known to be effective and with elements recognized internationally as good practice. The findings and key learnings of the review are presented below.

In Chile, the Ministry of Transport and Telecommunications is responsible for strategic planning, policy formulation and regulation of all modes of transport. The Ministry of Public Works (MOP) undertakes road planning and is in charge of all transport infrastructure except urban streets. The Ministry of Housing and Urban Development has

responsibility for urban street network nationwide. MOP responsibilities cover a wide span of public infrastructure, including inter urban highways, rural and urban roads, bridges, ferry landings, ports and airports. It is responsible for ensuring road designs and axle load regulations on the national network, conform to national safety standards, for installing various road safety standards and for installing various road safety features e.g. signs, barriers etc. The authority for establishing overall transport safety policy, standards and regulations is vested in the Ministry of Transport and Telecommunications (MTT). The national police is responsible for the enforcement of laws and regulations with respect to traffic regulations. The Ministry of Housing and Urban Development is responsible for ensuring design of urban streets conforms to road safety standards.

In Finland, the Ministry of Transport and Communication (MoTC) is responsible for policy and regulation of the transport systems and networks, transport of people and goods, traffic safety and transport related issues relating to climate and environment. The main responsibilities include providing strategic guidance and supervision of operation of its agencies through setting up of Annual Performance Targets. It prepares spending limits, an annual budget proposal, and an operating and financial plan. The Ministry also monitors use of funds allocated to the transport sector in the state budget. The Finnish Transport Agency (FTA) is an executive agency of MoTC. It is responsible for use, maintenance and development of the nationwide transport system, including roads, railways and waterways. FTA is organized in core functional areas encompassing all transport subsectors such as Operations Management (including planning, finance, legal and HR), Projects, Infrastructure Management, and Traffic and Information. The FTA is also responsible for implementation of large and complex projects such as road improvement on PPP mode, DBFOT type schemes etc. The MoTC sets annual targets for the FTA, including ones related to the services standard and condition of transport infrastructure, safety and environmental protection.

In Morocco, the Ministry of Equipment, Transport and Logistics (METL) is the peak governing body responsible for development of transport infrastructure such as roads, highways, airports, railways and ports. METL is organized in directorates for modes/functions: Civil Aviation, Ports/Maritime Transport, Road Transport, Road Safety and Public Roads. METL is also concerned with transport market reforms, including introduction of competition in the various modes of transport, economic efficiency and improving quality of service. Also, METL is responsible of freight logistics in Morocco and is implementing national logistics strategy including establishment of Moroccan Agency for development of logistics competitiveness.

In South Africa, the Department of Transport (DoT) is the key ministry for transport strategy, policy and regulation, as well as standards, procedures and financing of all transport modes. The structure of DoT is based on two core functions (transport planning and transport information) plus five transport modes (rail transport, road transport, civil aviation, maritime transport and public transport). Responsibility for transport is constitutionally divided between the DoT and the nine provincial transport departments. The DoT has exclusive responsibility for national and international airports, national roads, railways and marine transport. The national and provincial departments share

responsibility for other airports, public transport, road traffic regulation and vehicle licensing. The provincial departments have exclusive responsibility for provincial and local roads, traffic and parking.

In South Korea, the Ministry of Land, Infrastructure and Transport (MoLIT) has the overall policy, regulatory and funding mandate for all land transport modes and for aviation. MoLIT's organization has two functional streams (a) land and infrastructure (b) transport, each headed by a vice minister. The transport team has four branches - Transport and Logistics Office (includes transport policy, regulation and co-ordination functions as well as urban and public transport), Civil aviation office, Road Bureau and Railway Bureau. The Road Bureau is the central road agency of the government, where all policies related to public roads are formulated and all plans by various road agencies are reviewed and approved. The provincial and local governments are responsible for management of respective road network.

7.3 Key takeaways

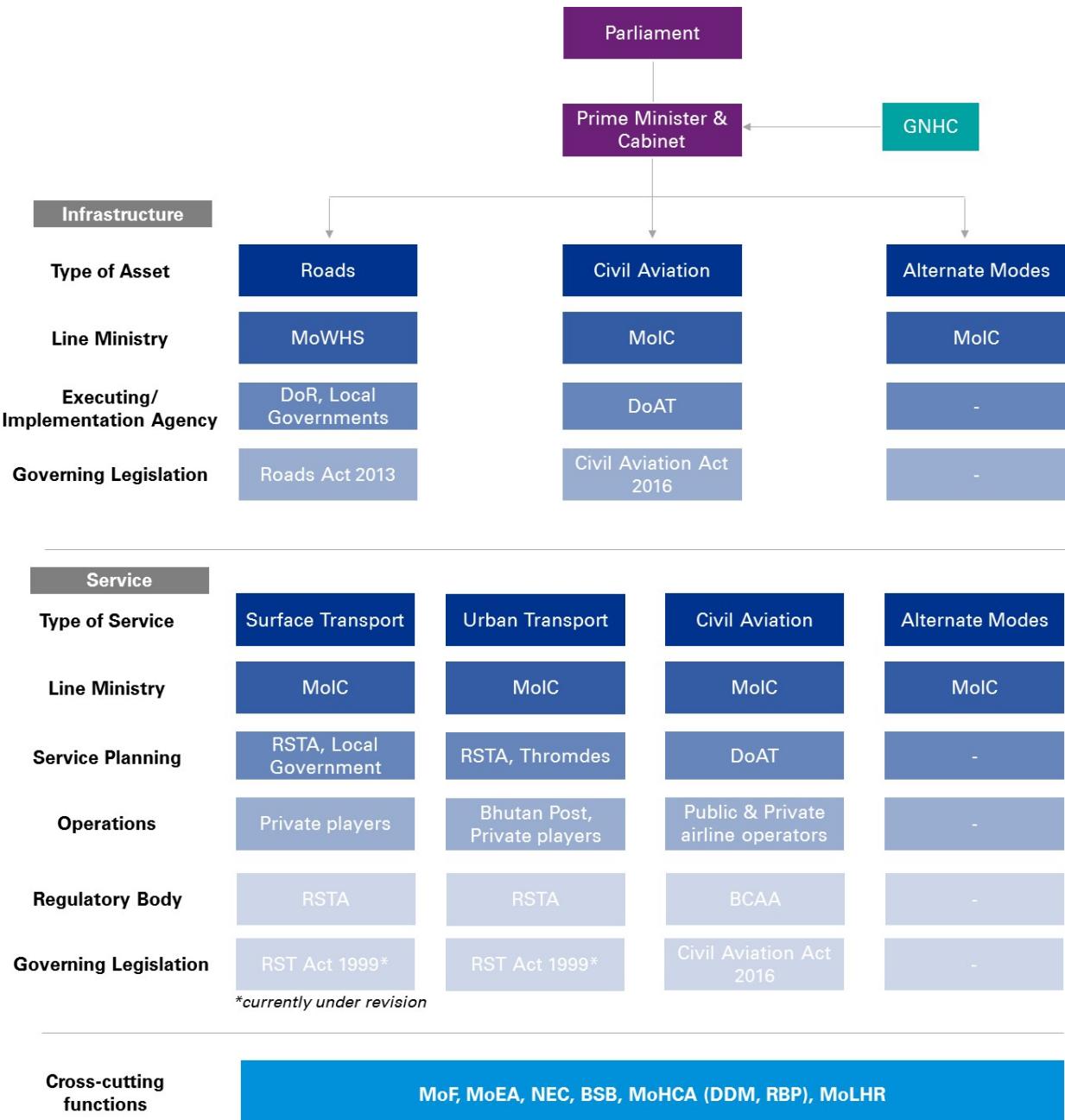
- The central transport ministry in each country have national strategy, policy and regulatory oversight of the sector on a multi-modal basis. They have published national transport strategy covering all modes of transport.
- The regulatory and service delivery roles are strictly separate. The delivery roles are generally performed through separate agencies within Ministry.
- Major trunk roads are managed at national level, regional and rural roads are typically managed at sub-national or state or provincial level, urban roads being managed at metropolitan or municipal level and local access and community roads.
- The road administration is typically split into Client function and Supplier function. Client function consist of planning and management of road operations, specifying the activities to be carried out, determining appropriate standards, commissioning works, supervising implementation, controlling works and monitoring. Supplier function consist of activities related to execution of works - the supplier role is concerned with delivering the defined road works to an agreed quality standard on time and within budget. Separating these clarifies the roles, increases focus and specificity of action, both of the management and the works execution functions. Finland and South Africa have complete separation of client and supplier functions in construction and maintenance of road infrastructure.
- Over past two decades, the road organizations in most of the countries mentioned above have become leaner with number of staff declining from thousands to few hundreds. This has been achieved mainly by gradually replacing in-house functions with competitively selected private contractors using performance based contracts to improve efficiency and foster innovation in construction and maintenance works, and by outsourcing some client functions such as surveys and design, works supervision, quality assurance and asset management to private companies.
- With respect to public transport, national government have a dominant role in (a) establishing national public transport policies (b) enacting legislation affecting public transport and (c) vehicle licensing. Municipal corporations are typically responsible for service planning, contracting and management of transport operations, setting fares and the provisions of public transport infrastructure within their jurisdictions.

- Private bus operators are the principal providers of public transport service in most of the urban centres of these countries, though metropolitan authority or municipal government sometimes do provide services with their own companies.
- Similarly, inter-dzongkhag bus services are also provided by the private sector with either national or regional government entities authorizing the service, and providing subsidies wherever needed.
- Most countries have a unit or department in the ministry that is responsible for freight logistics and in most cases this is responsible with other stakeholders for producing national logistics strategy.

7.4 Governance structure for transport in Bhutan

The governance mechanism for transport sector in Bhutan can be better understood by breaking the entire structure into the following layers i.e. institution that is involved in overall policy making & strategy formulation, institutions that are involved in both infrastructure creation and service delivery and institutions that are not directly involved in the above but nonetheless have an important role to play due to cross-cutting aspects of transport sector to eventually make it sustainable and inclusive. These institutions are ably supported by governing legislations to enable them perform their respective roles and responsibilities efficiently.

In Bhutan, while the overall responsibility of policy and strategy formulation lies with MoIC, several institutions play a role in infrastructure creation, service delivery and in regulating the sector. The figure below explains the institutional structure.



MoWHS: Ministry of Work & Human Settlement, **MoIC:** Ministry of Information & Communications, **GNHC:** Gross National Happiness Commission, **MoF:** Ministry of Finance, **MoEA:** Ministry of Economic Affairs, **MoLHR:** Ministry of Labour & Human Resources, **MoHCA:** Ministry of Home & Cultural Affairs, **BSB:** Bhutan Standards Bureau, **NEC:** National Environment Commission,

DoR: Department of Roads, **RSTA:** Road Safety and Transport Authority, **DoAT:** Department of Air Transport, **BCAA:** Bhutan Civil Aviation Authority, **DDM:** Department of Disaster Management, **RBP:** Royal Bhutan Police

Figure 77: Institutional structure for transport in Bhutan
Source: KPMG analysis

7.5 Roles & Responsibilities of Ministries, Departments & Autonomous Bodies

i. Ministry of Information & Communication (MoIC)

MoIC is the nodal body responsible for transport planning. It is involved in promoting the development of reliable and sustainable information, communications and transport networks and systems and facilitating the provision of affordable and easier access to associated services, particularly to meet the basic social needs and help improve living standards of people in rural communities of Bhutan. In context of transport, the following departments come under its ambit.

- **Road Safety & Transport Authority (RSTA):**

RSTA was established in 1997 with a view to consolidate all motor vehicle related activities under one organization. The main objective of RSTA is to:

- Develop regulations, guidelines and procedures applicable to road traffic, vehicle registration, driver licensing, roadworthiness and emission testing;
- Develop and implement road safety strategies including road safety education and training programs;
- Improve the efficiency and effectiveness of transport passenger facilities such as terminals and networks to meet the needs of the community;
- Ensure that a public transport system provided in the kingdom is efficient, effective, safe and reliable;
- Formulate transport policies and monitor the performance of any person or body contracted to provide transport services within the kingdom;
- Develop, co-ordinate, implement and monitor strategic plans and resource budgets related to transport activities.

RSTA discharges its core transport functions through three divisions namely Transport development division, Regulatory & safety division and Transport management division.

Name of division	Core function
Transport Development Division	<ul style="list-style-type: none"> • Review the existing legislation and propose amendment to the Road Safety and Transport Act and Regulations; • Facilitate studies and research under the land transport sector on areas such as eco-friendly urban transport, rope ways, railways, road, safety, road pricing etc.; • Propose appropriate plan of actions to implement the recommendations of ADB Report on the Bhutan Transport 2040: Integrated Strategic Vision; • Review and analyse the existing transportation fares/rates applicable to passenger and goods carriers and propose revisions; • Propose and execute activities under the Decade of Action for Road Safety 2011-2020 in consultation with the RS Division of RSTA through constant collaboration with the external bodies such as Ministry of Health, Bhutan Foundation and the WHO; • Promote innovative usage of ICT in Transport Sector (including

Name of division	Core function
	<p>ITS, e-governance, e-services, e-ticketing, PoS etc);</p> <ul style="list-style-type: none"> • Consult and develop project proposals, implement and monitor programs and budgets related to transport development; • Prepare Annual Work Plan for the Transport Development Division; • Co-ordinate programs under Joint Support Program of the Gross National Happiness Commission; • Coordinate with relevant agencies with regard to Climate Change and GHG emission programs and issues related to Transport. • Development of vehicle registration policies, regulations, procedures and guidelines; • Development of learner and driver licensing policies, regulations, procedures and guidelines; • Development of standard, uniformity and procedure for driving testing system. • Analysis and monitoring of central information system/record on vehicle registration and driver licensing • Development and maintaining Registration and Licensing Information including monitoring of e-ralis. • Monitoring the Regional and Base Offices on Registration and Licensing activities • Member of Tender, Human Resource and Sector Coordination
Regulatory & safety division	<ul style="list-style-type: none"> • development of vehicle standard specification and structure for commercial vehicles; • develop and co-ordinate fitness inspection and certificate program; • develop policies, plans and guidelines for motor emission testing; • development of safety operation and maintenance system/ program; • development of strategies for provision and use of measuring devices to detect speed of the vehicle, emission control, blood alcohol level of drivers and load of heavy vehicle including taxis; • development of safety education and public awareness campaign; • monitor and coordinate program for driving institutes; • maintenance of accident statistics and recommend safety measures; • develop and issues traffic regulations; • development of standards for traffic signs, signals and road markings; • conduct road safety audits; • implement activities included in the Decade of Action on Road Safety (2011-2020) • member of Tender, Human Resource and Sector Co-ordination Committee
Transport management division	<ul style="list-style-type: none"> • management and administration of commercial/ passenger vehicle contract system; • administration of passenger transport contract agreement; • development of policies and plans for passenger transport service; • prepare, implement and review Five Year/Annual Plan and budget • monitoring and evaluation of passenger transport services including compilation of passenger flow statistics;

Name of division	Core function
	<ul style="list-style-type: none"> • creating and maintaining infrastructure facilities (bus terminals and facilities) • prepare transport network plans and proposals • member of Tender, Human Resource and Sector Co-ordination Committee

Table 21: Functions of RSTA departments

Source: Annual Report for Financial Year 2015-16

▪ **Department of Air Transport (DoAT):**

Department of Air Transport (DoAT) has been recently established in 2015 after separating the operational services from regulatory functions, in line with the guidelines of International Civil Aviation Organization (ICAO). Prior to the split, both functions were handled by entity named Department of Civil Aviation. DoAT is responsible for all operational activities such as management and operations of airports, airfields as well as national air traffic services.

The main objectives of DoAT are:

- Promotion of civil aviation through formulation of clear development policies that are in accord with the international principles, and environmentally sustainable
- Development of infrastructure and provision of aeronautical services for safe, efficient and economical civil air transport service in Bhutan

▪ **Bhutan Civil Aviation Authority (BCAA):**

BCAA was also set up in 2015 as a regulator for the civil aviation sector. It functions in accordance to the provisions established under Civil Aviation Act, 2016 and Bhutan Air Navigation Regulations (BANRs). The Act empowers BCAA with full functional autonomy. The core responsibilities of BCAA are:

- Issue, renew, suspend, revoke and amend license of aviation personnel and conduct aircraft maintenance engineering license exam, as per enforcement manual;
- Inspect and license airports, aerodromes, heliports and airport safety and security services;
- Issue airworthiness certification of aircraft on the Bhutan Aircraft Registry;
- Inspect and license aircraft maintenance organizations;
- Inspect and maintain safety oversight of the airports and flight operations of commercial air services in and out of Bhutan;
- Provide economic regulation of commercial air services and license commercial air carriers to operate within and into Bhutan, including negotiation of air services agreements with other countries; and
- Monitor and regulate charges made for provision of air services within and to and from Bhutan, including charges made for use of airports in Bhutan and provision of associated services such as security, air traffic services, and air navigation services.

ii. Ministry of Works & Human Settlement (MoWHS)

MoWHS was established in 2003 with a view to focus on all construction activities relating to the transport sector. The Ministry is involved in formulating policies and development of plans related to physical infrastructure related to surface transport in the country & for implementing acts/ regulations/ standards related to such physical infrastructure. It has the following departments related to the transport sector.

- **Department of Roads (DOR):**

This department is involved in road network planning across the country, key responsibility being the planning, implementation & maintenance of National Highways (including primary and secondary highways as well as international/ Asian highways) along with setting up technical standards for roads. It also plans and maintains Dzongkhag Roads.

- **Department of Engineering Services (DES):**

There was increasing need for engineering services in the country and the technical support for local governments especially in view of the development focus stressed upon the 11th Five Year Plan. Therefore, to enable efficient delivery of services and to facilitate timely development, the parent body - Department of Urban Development and Engineering Services (DUDES) was bifurcated into the Department of Engineering Services (DES) and the Department of Human Settlement (DHS).

DES reviews construction plans, issues permits, and performs inspections to ensure engineering projects are built safely and in compliance with approved codes in force and regulations helping to create a vibrant, livable, and safe-built community across all urban centers except the four Thromdes - Thimphu, Phuentsholing, Gelephu & Samdrup Jongkhar.

- **Department of Human Settlement (DHS):**

This department is responsible for study of the existing scenarios and emerging trends and propose urban & rural development plans and strategies for specific urban & rural centers. It also undertakes studies to identify potential urban growth centers and recommends appropriate planning interventions. Further, the department focusses on an integrated planning approach to explore new and innovative planning techniques and mechanisms for a holistic perspective especially in view of the environmental sustainability, disaster risks reduction and climate change adaptations.

iii. Bhutan Post:

The bus transport service in the urban centres of Thimphu and Phuentsholing is provided by Bhutan Postal Corporation, also known as Bhutan Post. It also provides bus connectivity to Kolkata from Phuentsholing.

iv. Royal Bhutan Police (RBP):

Royal Bhutan Police is responsible for maintaining law and order and prevention of crime in Bhutan. The mandates of RBP are guided by the Royal Bhutan Police Act 2009. The Act provides the Royal Bhutan Police a substantive and procedural framework for jurisdictions, powers arrest (with and without warrant), investigation, prosecution, search and seizure, summoning witnesses, and regulating public assembly and public nuisance. It also codifies a framework for receiving complaints from the public. Though RBP operates as an independent body, the chief of RBP reports to the Minister for Home and Cultural Affairs.

As per the RBP Act 2009, an exclusive Traffic Division has been created. All the law & order activities pertaining to traffic control and operation are facilitated by this division. The roles and responsibilities of the Traffic Division are:

- Liasise with RSTA/ MoIC/ other agencies regarding planning and traffic safety regulations
- Conduct traffic awareness program
- Plan traffic control system in co-ordination with the field divisions
- Maintain Motor Vehicle Accident Information System
- Prescribe specific roles and responsibilities to the units under it from time to time

v. Local government

Dzongkhags: A dzongkhag is an administrative and judicial district of Bhutan, which is guided by the norms of Local Government Act 2009. There are 20 dzongkhags across Bhutan. Local government in each of the Dzongkhag is overseen by the Ministry of Home and Cultural Affairs. For the 20 Dzongkhags, transport master plans are developed by the corresponding Dzongkhag. It is also involved in the construction of the Dzongkhag roads. Also, Farm Roads implementation & maintenance is handled via Dzongkhag.

Gewogs: There are 205 Gewogs in total, which are presided by the Local Government Act 2009. Every Gewog gives input to the respective Dzongkhag in developing the Dzongkhag transport master plan. Farm roads planning is handled through Gewogs. It also does the maintenance of the tracks & footpaths in its corresponding jurisdiction.

Thromdes: The Thimphu, Phuentsholing, Gelephu and Samdrup Jongkhar Thromdes are administered independently and responsible for road construction, implementation and maintenance in their respective jurisdiction. The Thromdes are administered independently by a Thromde Tshogde as they are sufficiently developed and populated. Further, 16 Dzongkhag Thromdes are established per Dzongkhag. As per constitution amendment, each dzongkhag should have at least one Yenlag Thromde, which is second largest town within Dzongkhag.⁵⁴

vi. Gross National Happiness Commission (GNHC)

⁵⁴ <http://thebhutanese.bt/dzongkhag-thromdes-in-motion/>, The Bhutanese, Tshering Dorji, 05/09/2015

In January 2008, Planning Commission was renamed as the Gross National Happiness Commission. The main task of GNHC is to ensure that gross national happiness is embedded firmly into RGOB policies and that proper coordination is undertaken to ensure proper implementation of plans and programs. The membership of the GNH Commission is as follows: PM as chairman, Cabinet Secretary as the vice chairman, secretaries to the ten ministries as well as the head of the National Environment Commission as members, and the GNHC Secretary as the member secretary. The mandates of the GNH Policy are as follows:

- Our people - investing in the nation's greatest asset
- Harmonious living - in harmony with tradition and nature
- Effective and good governance
- Developing a dynamic economy as the foundations for a vibrant democracy

GNH policy serves as a unifying vision for Bhutan's five-year planning process and all the derived planning documents that guide the economic and development plans of the country. The four pillars of GNH philosophy are:

- Sustainable development
- Preservation and promotion of cultural values
- Conservation of the natural environment, and
- Establishment of good governance

All the strategic transport planning decisions are undertaken via the compliance and support of GNHC. The GNHC monitors the preparation of each master plan to ensure quality, consistency and compatibility with overall national objectives and financial constraints. Also, any new policy must pass a GNH review which is based on a screening tool consisting of 22 variables.

vii. National Environment Commission (NEC)

NEC is an independent authority setup to conserve and protect environment and is responsible for all matters relating to environment by regulating environmental impacts and promoting sustainable environment.

In context of transport sector, NEC's working is governed through three acts:

- National Environment Protection Act 2007 - which provides mandate to NEC to participate in transport related matters;
- The Environment Assessment Act 2000 - which governs all development activities undertaken in Bhutan including roads development; and
- Waste Prevention and Management Act 2009 - which authorizes NEC to establish standards and guidelines for disposal of waste

The NEC specifies vehicle emission standards which in turn are enforced by spot checks on vehicles performed by RSTA. In Sept 2015, the Commission has also communicated its commitment to the intended nationally determined contribution (INDC) of the Kingdom of Bhutan to the UN Climate Change Secretariat.

viii. Ministry of Finance (MoF)

The Ministry aims to formulate and implement dynamic fiscal policies and sound financial management through maximization of resource generation, efficient allocation, prudent expenditure and debt management, and proper accountability of public resources. It has the following departments relevant to the transport sector:

- **Department of National Budget (DNB):**

This department enhances the budgetary system via formulation of effective and sound budgetary policies. It allocates the budget meant for various elements of transportation.

- **Department of Revenue & Customs (DR&C):**

To ensure that the tax and customs administration have the capacity to collect taxes efficiently and effectively at minimum cost through impartial and consistent enforcement of regulations, especially at the Border Crossing Points (BCPs).

Apart from direct budgetary allocations, additional financial assistance offered to various ministries under RGOB, in the form of grants or loans, by multi-laterals is also routed through an agreement between the Ministry of Finance and the multi-lateral agency.

Further, to tap the finances from private sector under public private partnership route, RGOB has established a PPP Agency (P3A) under the Ministry of Finance. Though Bhutan's experience in PPP has been limited so far, RGOB recognizes the importance of economic growth and social development through improved infrastructure and efficient utilization of resources, and has therefore embarked on promoting a Public Private Partnership (PPP) framework. In this regard, Bhutan has developed a PPP policy in the year 2016.

ix. Ministry of External Affairs (MoEA)

The Ministry mandates the creation of an enabling environment, including institutions and infrastructure for the sustainable growth of the economy. MoEA through its Department of Trade does the groundwork for bilateral, regional and multilateral trade negotiations in consultation and collaboration with relevant agencies and stakeholders, including private sector. These treaties are undertaken with a view to augment trade with regional economies. Transport sector by providing better regional connectivity therefore plays an important role. Various stakeholders of transport sector therefore have to closely coordinate with this ministry. The department also has a responsibility of development of dry port facilities and other logistic infrastructure.

x. Bhutan Standards Bureau (BSB)

BSB was set up as an autonomous organization in 2010 to coordinate and oversee all standardization and conformity assessment activities in the country. It aims to foster and promote standards and standardization activities as a means of advancing the national economy, benefiting the health, safety and welfare of the public, assisting and protecting consumers, protecting natural environment, promoting industrial efficiency and development and facilitation of domestic as well as international trade. The BSB approves civil engineering standards as well as road safety signs and symbols with respect to transport sector⁵⁵.

xii. Department of Disaster Management

With reference to transport, Ministry of Home and Cultural Affairs (MoHCA) through its Department of Disaster Management (DDM) seeks to develop and coordinate awareness raising and building capacities on disaster mitigation, preparedness and response, especially while building the transport infrastructure.

xiii. Ministry of Labour & Human Resources (MoLHR)

The Ministry aims to facilitate human resource development for economic development and to ensure gainful employment for all Bhutanese workforce. Through its Department of Human Resources, the ministry aims to achieve a globally competitive workforce for a cohesive society and secure economic future for all citizens by encouraging programs on Technical Vocational Education and Training and Human Resource Development Activities. Further, through the Department of Employment, it aims to promote and facilitate gainful employment through provision of effective employment services.

7.6 Issues with current structure

As observed in the previous section, the roles and responsibilities of various institutions, irrespective of their direct or indirect involvement in transport, are quite clearly defined. While stakeholder consultations indicate that there are instances of overlaps/contradictions amongst various agencies, it appears that these emerge as a result of ambiguity or absence of rules and regulations. For instance, road safety audit has involvement of both DoR as well as of RSTA. Similarly, there is lack of clarity on who would regulate automobile workshops i.e. NEC or Thromdes. Further, while RSTA's mandate includes planning for alternate modes of transport, it is not clear on who would execute the development of infrastructure or get involved in the service delivery. These contradictions can be very well resolved by strengthening existing or creating new legislations duly supported by proper rules and regulations. For ex, regulations for vehicle emission or fuel quality or for automobile workshops. Chapter 8 on review of legislative framework discusses various recommendations to strengthen the legislative environment.

The core issue within the existing governance structure is the dual role of RSTA. The agency in its current mandate is responsible for both setting up of road safety regulation,

⁵⁵ www.bsb.gov.bt

standards and targets and is also responsible for its enforcement. This creates an inherent conflict of interest.

Besides the above, the other area of concern is the technical capacity of various institutions. The local governments will be responsible for construction of bus terminals, taxi parking, multi-level parking, ICT infrastructure etc. While this devolvement of role is aligned with global best practices, the capacity constraints faced by local governments as well as no clarity on rationalizing existing staff undertaking this work at ministry level poses a serious delivery challenge on part of the local governments. Human resource development issue is at levels of governance and not just restricted a single institution or level.

With regards to service delivery, the government should also have a clear standpoint on the extent of their involvement, the levels of government which should be involved and finally on the extent of participation expected from the private sector. For example, Bhutan Post provides city bus service to Thimphu Thromde. The city bus service is regulated by RSTA in terms of route planning, service planning, fixation of fares, etc. Thimphu Thromde has no role in provision as well as service planning as well as service delivery of city bus transport in Thimphu.

The logistics sector is relatively underdeveloped in Bhutan hindering overall trade and commerce of the country. Bhutan's rankings on the Logistics Performance Index (LPI) at 135, is significantly lower than its land-locked counterparts in Nepal, Myanmar and Mongolia. Bhutan ranks poorly in areas of infrastructure, customs, logistics competence, tracking and tracing and timelines. Between Thimphu-Phuentsholing link, around 150-200 trucks ply per day. According to a study by ADB, this is anticipated to increase to some 2,000 freight vehicles per day by 2020, and grow to 7,500 by 2040. Given the anticipated growth in freight, a concerted focus is required involving relevant ministries, logistics service providers and users. Logistics improvement will contribute positively to Bhutan's internal economic development policy.

Based on the appraisal of the current governance structure for transport in Bhutan through extensive consultation of local stakeholders and a thorough review of the international best practices, various changes are suggested to improve the governance efficiency within transport sector. The same are outlined in the next section.

7.7 Recommendations on improving governance of transport

Review of RSTA's mandate and separation of service delivery and regulatory functions

As mentioned earlier, RSTA's role is presently a mix of service delivery and regulatory functions and requires to be separated. The integrated role leads to potential conflicts and is also not as per good industry practices studied. The OD exercise carried out by RCSC also proposes to split RSTA. RCSC proposes to separate the service function by carving out a new department and naming it as "Department of Surface Transport". Further the regulatory role of RSTA is proposed to be carved out to an autonomous body.

- **Department of Surface Transport (DST):**

The main roles and responsibilities of this department is proposed to be as follows:

- Ensure that a public transport system provided in the kingdom is efficient, effective, safe and reliable
- Formulate transport policies for all modes of surface transport including alternate modes such as ropeways, cable-car, railways and riverine and monitor the performance of any person or body contracted to provide such transport services within the kingdom.
- Improve the efficiency and effectiveness of transport passenger facilities such as terminals and networks to meet the needs of the community
- Develop, co-ordinate, implement and monitor strategic plans and resource budgets related to transport activities
- Develop and implement road safety strategies including road safety education and training programs

- **Regulatory authority**

The regulatory role of RSTA is proposed to be carved out and given to an autonomous body. The functions of the regulator shall be:

- Develop regulations for road traffic, vehicle registration, driver licensing, road worthiness and emission testing;
- Fix price band for different kinds of services in an objective and transparent manner;
- Ensure service coverage across regions (including rural and remote areas) and provide mechanism for compensation for discharge of universal service obligations (provision of service on non-remunerative routes and remote rural sector);
- benchmark quality of road passenger service;
- impartially address various operational issues like access to terminals and other common infrastructure facilities to all operators; and
- Promote competition to curb anti-competitive practices.

Creation of separate transport ministry in the long run & renaming of MoIC as Ministry of Transport & Communications

The mandate for transport presently is spread between two ministries - MoIC and MoWHS. The current structure creates a list of mandates to deliver particular types of transport infrastructure, with little incentive or ability to consider how these pieces interact with each other for moving goods and people. While MoIC is the principal body for policy and strategy formulation for all forms of transport, planning and execution function for roads rest with MoWHS. This means that strategies concerning physical infrastructure for surface transport and its use lies with one institution while investments in other aspects of surface transport such as rolling stock, road safety planning, etc lies with another leading to a disaggregated view on transport as a system.

While the structure may still be manageable as presently the modes of transport are limited to roads and aviation, the complexities are going to grow as and when alternate modes of transport such as railways, ropeways and waterways get developed within the country. As Bhutan moves into the future towards developing a sustainable transport system, it is imperative that in the long run all transport sectors are integrated into a single ministry.

In the short run, however, the existing structure can be continued with strengthening of role of MoIC as a central planning and policy making body and designating and stronger co-ordination mechanism with other infrastructure developing or service delivery agencies both at central and local level. As a part of this strengthening exercise and to bring a greater focus for transport within MoIC, given it is large part of the ministry's mandate, it is suggested to rename MoIC as Ministry of Transport & Communications.

Creation of a separate Department/ Cell within MoIC for governing freight and logistics sector

The governance in freight sector requires improvement. In the present form there is no public sector face of logistics sector within the country. As a central planning body for transport, the mandate of MoIC should be extended for logistics planning as well. It is proposed that a Cell or Department within MoIC be created that focuses on only logistics activity. The Cell/ Department should be headed by a Director who reports to the Secretary, MoIC. To strengthen the technical capabilities of such Cell/ Department, a consultative committee may be created to provide interface with the public and private sectors.

Greater autonomy of Thromdes in urban transport planning

Review of best practices indicate that municipal corporations/ urban local bodies typically function with a greater autonomy. Presently, the public transport route planning, fare fixation for buses, etc are undertaken by RSTA while the bus transport system is delivered through Bhutan Post (and some private operators). Thromdes should be responsible for public transport planning including service delivery planning. The actual service delivery may however be done by private operators but the service level contracts should be framed by Thromdes as they have a better understanding of the local level issues. While devolvement of powers is a step in the right direction, RGOB should strive to make Thromdes empowered for entire gamut of urban transport in the long run and not limiting their role to only urban road development and maintenance. This exercise may be started with Thimphu Thromde, which is the major urban body currently and may gradually be extended to other Thromdes. Further, Thromdes should be encouraged to generate other innovative sources of financing such as land value capture financing, congestion charges, etc. Suitable amendments to the Thromde Finance Policy must be made to enforce this.

Skill enhancement and capacity augmentation

There is also an imminent need for capacity augmentation to cope with the intended objectives of revamping the institutional structure. Stakeholder consultations with entities such as BCAA, MoWHS, Local Governments, etc buttress the importance of strengthening the technical capacities of these institutions in delivering the transport mandate. The OD exercise also recognizes this need and has proposed to form a “Department of Technical Education (DTE)” for imparting technical education and developing viable models for skill development to ensure that the competency levels of the existing/ newly recruited workforce is at par with the international standards.

Strengthening the involvement of National Land Commission Secretariat (NLCS) in transport planning

There is a strong need for integrating land use and transport planning since land as a resource is limited and urbanization is quite rapid leading to settlements getting spilled outside city limits with haphazard and unplanned construction. The NLCS was established in 2007, after revision of the Land Act 1979 and presently functions as an autonomous body. Its mission is to manage, regulate and administer the ownership and use of land, guarantee the security of land tenure & ensure easy access to reliable land information.

It is proposed that there should be greater co-ordination between NLCS and other ministries/ departments involved in transport for facilitating development of an integrated transport and land use planning by providing geospatial information using tools such as GIS, GPS, Remote Sensing, etc.

Chapter 8: Review of Legislative Framework

8.1 Introduction

The transport sector in Bhutan is regulated through the following acts. Road sector is regulated through Roads Act of the Kingdom of Bhutan 2013 and Road Safety & Transport Act 1999. It is understood that RST Act 1999 is under revision and a RST Bill 2017 is already drafted and uploaded at MoIC website for wider stakeholder discussion and public consultation. The civil aviation sector is governed by the Civil Aviation Act 2016. The consultants have reviewed various provisions of these Acts/ Bill. This chapter presents a summary of the various legal provisions and suggests key recommendations for strengthening of the same.

8.2 Review of Acts

8.2.1 Key provisions of the Roads Act 2013

The Roads Act 2013 has been enacted with a view to establish a safe and efficient system of road network across the country. It is through this act that the Department of Roads (DoR) under MoWHS and the Local Government are empowered to perform its functions relating to construction, maintenance, safety and management of roads. Some of the key provisions of this Act are enlisted below:

- **Administration of roads**

Chapter 2 of this Act mentions that DoR is the national authority for all roads in the country. It further says that the administration and management of Thromde roads shall be under Thromde Administration. Similarly for Dzongkhag and Gewog roads, the respective Dzongkhag and Gewog administration shall be responsible for its administration and management.

- **Powers and Functions of the Ministry, DoR & Local Government**

Chapter 3 defines the powers and functions of the Ministry, DoR and the Local Governments. It directs the ministry to initiate formulation of policies with regard to the national road network, endorse long term master plans and five year plans for approval from the government. It is through this chapter that the Ministry is also empowered to formulate policies for Public Private Partnership for road construction and tolling. It states that a Concession Agreement can be executed either by the DoR or by the Local Governments with a private sector partner who could be a local company or a foreign company. In case of foreign company, DoR is required to take necessary approvals from MoWHS.

Further, it directs the DoR and Local Governments to implement the long term master plan and five year plans. This chapter empowers the Local Governments to formulate and endorse road plans within its network and submit them to the DoR for approval. It also directs the Local Governments to accord technical and administrative approvals for construction, repair and maintenance of roads administered by it.

- **Tolling of roads or bridges**

Tolling is permitted on any road (or bridge) i.e. national highways or roads under Thromde or Dzongkhag jurisdiction as per the provisions of Chapter 5 of this Act by virtue of a toll order issued either by DoR or Thromde or Dzongkhag, as the case may be. MoWHS shall endorse such toll order.

- **Construction of cycle tracks, footbridges, sub-ways and footpaths**

Chapter 6 of this Act directs for construction of cycle tracks, footbridges, sub-ways and footpaths on any road by DoR or the Local Government. However, as per the provisions, the implementation agency is not mandated to undertake such construction. Such construction is optional.

- **Maintenance and improvement of roads**

Chapter 7 of this Act empowers the DoR and the Local Governments to maintain and improve roads administered by them.

- **Register of roads**

One of the provisions under Chapter 15 of this Act requires DoR and the Local Government to maintain a register of roads for the entire network.

- **Technical and safety standards for roads**

The Act through its Chapter 16 lays down the technical and safety standards for various roads. It also empowers DoR to carry out safety audits from time to time and issue corrective directions as required.

- **Road inspectors**

Chapter 18 of the Act provides for appointment of road inspectors by DoR or the Local Governments for roads under their respective jurisdiction. Through this provision, the road inspector is empowered to enforce the rules, regulations and standards, take measures to prevent any violations.

8.2.2 Recommendations to strengthen the Roads Act 2013

- **Incorporating provisions for road asset management system**

As recommended in Chapter 3 of this report, to bring in a culture of road asset management, DOR needs to institute a robust road network asset management system. This will involve specifying asset performance indicators for each road class, developing a scientific assessment of present conditions and determine its priorities for maintenance interventions on rational basis.

As a first step in the direction, all information pertaining to the consolidated inventory of road assets needs to be maintained and updated at regular intervals. GIS platform can be very effectively used to develop and maintain such information records for all kinds of roads. The asset management plan within the jurisdiction of DOR should at least include:

- Inventory of assets
- Present condition of its network including bridges, tunnels developed alongside
- Assessment of extent of maintenance required based on factors such as present and projected traffic volumes, local weather conditions, relative importance of such road, etc
- Annual maintenance plan based on budgets available or allocated
- Impact on deterioration and performance of the road network for which funds are not available

While the current act has provisions for creation of a register for roads, it needs to elaborate on the contents on the lines of the above mentioned points. Similarly, the chapter on maintenance and improvement of roads needs to be broadened by bringing in the principles of road asset management system.

- **Strengthening the provisions of private sector participation**

The current provisions of the Roads Act 2013 allow for private sector participation of both domestic and foreign companies, subject to approval from MoWHS. It is recommended that separate model concession agreement (MCA) documents should be drafted by Bhutan which should be adopted by RGOB with concurrence from key stakeholders such as Ministry of Finance.

The experience of India in PPPs in National Highways is indeed very useful to refer. In India, in order to specify the policy and regulatory framework on a fair and transparent basis, MCA for various forms of PPP structure were introduced and adopted by the Government of India. These documents were drafted with a view to be transparent in the bidding process with principles of balanced risk sharing. These documents are not static and have been updated from time to time to address the concerns of all stakeholders including principal concern of lenders such as land acquisition and protection in the event of default.

RGOB should chalk out a path for private sector involvement in roads sector and to this extent strengthening of the provisions of this Act would facilitate in creating a conducive environment. This would also synergize with the provisions of asset management where global experiences show that private participation in O&M can be successfully implemented.

- **Inclusiveness in road development**

The road building programme of Bhutan is developed on the philosophy adopted by RGOB where the basis of road development shall be done on the principles of social

justice and equality and not on the economic criteria alone. It is therefore important that accessibility provided to the users is not just for one strata of the society but also for a segment which is disabled. While there are provisions for development of cycle-tracks, foot-bridges, etc. in the existing Act, the development of the same is not mandatory as per the Act. To build a truly inclusive system, universal accessibility should be provided at infrastructural level. This means that the pedestrian paths and crossings, parking facilities and access to public land uses should be inclusive in their design for differently abled persons. To this extent, the existing provisions of the Act should be suitably modified and earnest efforts should be put to build an inclusive infrastructure wherever technically feasible.

- **Dedicated road safety unit within DOR**

To improve road safety, ADB has been providing technical assistance to Bhutan. One of the recommendations, which also has consensus from various stakeholders within Bhutan Government, is towards establishment of a dedicated road safety unit within DoR. The unit should be adequately equipped to handle road safety matters. Suitable provisions that facilitate creation and functioning of such unit may be incorporated in the Act itself.

8.2.3 Key provisions of the draft Road Safety and Transport Bill, 2017

The draft Bill has been tabled for wider stakeholder consultation and is proposed to replace the existing Road Safety and Transport (RST) Act 1999. The objectives of this Act are to provide safe, reliable, efficient, environment friendly & inclusive transport system and establish systems & procedures for licensing of drivers as well as registration of motor vehicles. The Act empowers RSTA to carry out its obligations and functions in accordance with its provisions and is granted functional autonomy.

The draft proposes establishment of a Board consisting of members from government agencies as well as private sector. The board shall be responsible for performing all regulatory functions as deemed necessary for efficient operation of transport system. The provision for setting up of a board doesn't exist in the current RST Act 1999.

RSTA through this Act is entrusted with the following powers and functions:

- Regulate road safety and other mode of transport, except aviation, in the country;
- Specify road accident prevention practices and to promote the adoption of those practices within the community;
- Licensing of drivers, instructors and operators;
- Develop and implement regulations applicable to transport;
- Regulate the public transport system in such a manner that it is efficient, effective, safe and reliable;
- Enforce the emission standards set by National Environment Commission or any other relevant agencies;
- Regulate taxi meter in line with the revised fares and transport rates;
- Issue permits for foreign motor vehicles to ply in Bhutan in accordance with the conditions prescribed under the rules and regulations;

- Monitor traffic management strategies and practices; and
- Develop and train all personnel to carry out their duties and responsibilities effectively and efficiently to improve road safety and public service delivery.

It may be noted that the provisions of this bill do not separate the regulatory and administrative functions of RSTA. Clause 26 (6) of the Bill states that RSTA can “review, approve and revise fees and charges as necessary for various *services provided by the Authority or by any service provider*”.

The bill proposes financing of the activities undertaken by RSTA by creation of a separate “Transport Development Fund” apart from the regular budgetary grants allocated by RGOB. This provision also doesn’t exist in the existing Act.

Under the Road Safety chapter of the proposed Bill, there is a provision for motor vehicle safety standards. It states that the motor vehicles plying within the country shall meet the safety standards established in the rules and regulations and all other international standards of ISO. It grants RSTA the powers to cancel or suspend the vehicle registration or prohibit its use in case the vehicle doesn’t meet the required safety standards.

Further, it proposes to empower RSTA to conduct road safety audit. It may be noted that Chapter 16 of the Roads Act 2013 also empowers DoR to conduct similar such audits. Thus, there appears to be a duplication of responsibility for this function.

There are provisions which require the vehicles to have a valid emission testing certificate from an authorized testing center and empowers them to inspect any vehicle. It also proposes that the testing centers could be provided by private parties including civil society organizations.

The Bill proposes to lay down post-crash response procedures and standards through rules and regulations in consultation with the relevant agencies and directs the relevant agencies to comply with the same.

Further, the bill proposes to lay down rules and regulations to restrict or prohibit the use of motor vehicles.

With regards to learner or driver licensing, the bill states a minimum age of 18 years for issuing such license. It also has provisions for instructor licenses. For driving under the influence of alcohol and drug substances, the bill proposes that the driver holding learner’s license or license less than 3 years old, cannot drive the vehicle under any influence of alcohol. In other cases, there is limit not exceeding 0.08 grams per 100 ml. For commercial vehicles, the driver cannot drive under the influence of alcohol. The bill authorizes the person inspecting for drug or alcohol use to demand the driver to hand over the license or retain the vehicle or even suspend the license in accordance to the prescribed rules and regulations.

To regulate the traffic, the bill proposes laying of rules and regulations on speed limits and also require the relevant agencies to erect traffic signs. The insurance provisions require

the driver to compulsorily maintain a comprehensive insurance policy against damage to vehicles, third party property and injury or death to a person.

There is a chapter on commercial vehicle and foreign vehicle permit where it lays down various obligations to hold a permit. There are provisions for overloading of vehicles as well which restricts the driver to load the freight beyond the designed capacity of the vehicle or of the road, failing which financial penalties shall be imposed and license shall be suspended for 1 year. All foreign vehicles are also required to ply within Bhutan with a valid permit issued by RSTA failing which there are penalties.

Further, there is a chapter on offences and penalties with provisions for reckless driving, culpable driving, hit and run cases, driving of unsafe commercial vehicles, driving without a valid motor vehicle registration, bribing, etc.

8.2.4 Recommendations to strengthen the draft

The new Bill, proposed to replace existing RST Act 1999, is a more comprehensive document and covers various provisions which don't exist in the current Act. For instance, the bill proposes creation of a Board having member participants from both public and private sector entities. Similarly, it talks about creation of a Transport Development Fund for financing RSTA's activities. There are clear provisions for offences and corresponding penalties.

The draft can be further strengthened on the following areas:

- **Improving the provisions of driver licensing**

The bill currently proposes a minimum age of 18 years for issuing of any driver license. However it does not give any directions on periodic renewal of the same or age cap. Learnings can be drawn from India's recently amended Motor Vehicles Act which clearly draws out categories for driver licensing. If the person applying for the license is (i) below 30 years, his license will be valid till he turns 40 years; (ii) between 30 and 50 years, his license will be valid for a period of 10 years; (iii) between 50 and 55 years, his license will be valid till he turns 60 years; (iv) above the age of 55 years, his license will be valid for a period of 5 years. It also seeks to simplify the procedure for granting of license by use of online system. It also seeks to establish a National Register of Driving Licences containing data on all driving licences issued throughout India and facilitate the grant of licences in a transparent and efficient manner.

- **Provisions relating to vehicle fitness**

The current provisions relating to certificate for vehicle fitness can be further strengthened by clearly mentioning that there will be automated testing facilities at authorized testing stations for grant of certificates of fitness to motor vehicles and no certificate of fitness shall be granted unless the motor vehicle is tested at such automated testing facilities. Production of vehicle emission test certificate will be made mandatory during annual vehicle road worthiness inspections.

- **National register of motor vehicles**

Chapter V of the draft Bill talks about the obligation of the person to register the motor vehicle. The provisions of this chapter can be strengthened by mandating RSTA to maintain a National Register of Motor Vehicles that shall contain data on all motor vehicles registered throughout Bhutan. It should further state that no certificate of registration shall be issued or renewed unless it has been issued a unique registration number under the National Register. The National Register for motor vehicles along with a National Register for driving license will bring in harmony in the registration and licensing process.

- **Exempting vehicles operating under a scheme to get a permit**

Chapter VII of the draft Bill requires any commercial vehicle to operate only with a valid permit. It is recommended that these provisions can be relaxed for those commercial vehicles which are operating under a government scheme for carrying either passengers or goods.

- **Exempting stage carriage or contract carriage operating in rural areas to get a permit**

To promote rural connectivity, the provisions may empower RSTA to waive any permit condition for a stage carriage operating in a rural area. Similarly, it may be empowered to waive any permit condition for a contract carriage to promote low cost last mile connectivity solutions. The provisions should seek to facilitate empowerment of marginalized and vulnerable groups through preference in issuance of permits.

- **Law on good Samaritans**

While various provisions exist in the Bill to enhance road safety measures, the Bill can add additional measure by incorporating the provision of good Samaritans. The broader philosophy of such provision is to provide legal protection to people who give assistance to the people who have met with road accidents and reduce their hesitation to assist for fear of legal ramifications. India has recently amended its Act to incorporate this provision and the same may be considered in the draft Bill under the ambit of road safety.

- **Establishment of National Road Safety Board**

It is understood that one of the key recommendations of Bhutan Transport 2040 strategies report, which also has a broader consensus amongst stakeholders, is towards the establishment of National Road Safety Board. The Board shall act as the lead agency for road safety activities. In the workshop held by ADB on technical assistance for road safety, there was also a general consensus amongst the stakeholders on the proposal to create an adequately resourced secretariat to manage the proposed Board activities. Till such Board is formulated, RSTA can play the role of the lead agency by formulating a steering committee. Suitable provisions to institutionalize the same may be incorporated in the new draft Bill.

- **Creation of a Road Safety management fund**

Currently, the government funding in the form of annual budgetary allocations to the concerned departments and agencies is the main source of funding for road

safety programs and activities in Bhutan. There are no any other dedicated sources for sustainable funding of road safety. There is also no established procedure in place for systematic and rational allocation of funds and resources across road safety agencies.

The ADB report on road safety mentions that all best practice countries around the world have estimates of the annual socio-economic costs of road crash fatalities and injuries and they use the same for securing sustainable funding sources for road safety. The socio-economic costs of road crashes to the country's economy should be used as a tool to leverage more financial resources from the government to spend as an investment for road safety. It is imperative that Bhutan establishes and adopts a more formal funding procedure to fund road safety activities in a sustainable way. This can include mechanisms to allocate a portion of general tax revenues, to allocate specific user fees or even a portion of road funds and these can often be supplemented by allocations from levies such as on insurance fees. Adequate provisions should accordingly form a part of the proposed draft Bill.

- **Clarifying the provisions on road safety audit**

As stated earlier, both Roads Act 2013 and the draft RST Bill 2017 empower DoR & RSTA to conduct road safety audit. This may result in duplication of responsibility or conflicts. Provisions in either or both the documents should be amended to avoid ambiguity.

Chapter 9: Summary of Recommendations

The policy recommendations for each sub-sector within transport i.e. roads & road transport, urban transport, civil aviation and regional connectivity are summarized below. Also summarized are the list of changes required in the current governance structure to make them more streamlined and transport sector friendly. Recommendations have also been provided on the amendments required in the legislations that enable efficient functioning of the institutions. These recommendations collectively form the basis for formulation of Bhutan's National Transport Policy 2017.

Road and Road Transport

1. Road asset management system

- a) The asset management plan should at least include:
 - Consolidated inventory of assets to be maintained and updated at regular intervals
 - Present condition of its network including bridges, tunnels developed alongside
 - Assessment of extent of maintenance required based on factors such as present and projected traffic volumes, local weather conditions, relative importance of such road, etc
 - Annual maintenance plan based on budgets available or allocated
 - Impact on deterioration and performance of the road network for which funds are not available
 - Present techniques of incident management including disaster management and accident management, particularly for its national highways
- b) The national highway network is presently of ~2,400 kms and will be expanded by another 500+ kms after completion of SEWH. RGOB to explore the commercial viability of structuring them on toll-operate-transfer (TOT) model for say a defined concession periods of 15-20 years.
- c) Performance based maintenance contracts with private sector for the established road network can also be explored.
- d) A special purpose vehicle company approach should be adopted for entering into such contracts to allow more freedom in day to day management.

2. Improvement of Transport Service Delivery

- a) RGOB to set the minimum service level standards for each Gewog and Dzongkhag.
- b) Bus service delivery should be continued through the private sector model. Route dispersal guidelines to be created with bundling of profitable and unprofitable routes. Wherever such bundling is not resulting in sufficient private sector interest, RGOB to support with a viability gap funding or through fiscal incentives.

- c) In areas where bus/ mini-buses are not viable, similar delivery models to be developed using smaller vehicles such as Boleros with an intent to augment services with medium or large buses as and when the demand justifies the case.

3. Road Safety

- a) Implement the recommendations under the five pillars of DOA for road safety

Pillar 1: Road Safety Management

Institutional Capacity:

- Establish a National Road Safety Board/Council in line with the recommendations in Bhutan Transport 2040 Strategies Report
- Develop a National Road Safety Strategy with final and intermediate outcome targets
- Implement the Bhutan “Decade of Action for Road Safety (2011 - 2020)”
- Establish and implement a modern Crash Data Management system
- Establish official socio-economic costs of road fatalities and injuries and use for cost benefit analyses

Legislation:

- Updating RST Act 1999

Funding:

- Establish socio-economic costs of road fatalities and injuries
- Having dedicated funding through channelizing alternate funds

Road Safety Promotion:

- Coordinate and plan road safety promotion
- Combine publicity and high visibility enforcement
- Find the right message to the separate high risk groups

Pillar 2: Safer Roads

- Establish a dedicated Road Safety Unit within DOR
- Improve human resources and capacity in DOR and RSTA
- Update Road Design Guidelines/Standards to cover road safety aspects adequately
- Institutionalize and implement Road Safety Audit and Black Spot management as a regular activity
- Vulnerable road users' specific problems need to be addressed with proper infrastructure
- Improve and implement system for control of overloading
- Investment on road safety interventions should be based on socio-economic cost of road crash fatalities and injuries.
- Monitor and evaluate impact of road safety investments.
- Develop/update the signage manual and develop guidelines for matching the speed limit with road function and road layout
- Install signing in general and especially speed limits where needed (enforcement)

- Clarify the roles and responsibilities in regard of speed limit decision process, record keeping, procurement, budget and installation between RSTA, DOR, Police and other stakeholders.
- Improve and enforce land-use planning regulations for road accesses to the highways and urban streets

Pillar 3: Safer Vehicles

- Improve the mandatory vehicle inspection system and build adequately equipped inspection stations.
- Implement random vehicle inspections and establish a dedicated Unit in RSTA and/or in Traffic Police.
- Make the vehicle registration data base system accessible to all.
- Deregister all vehicles after 15 years without renewed yearly mandatory registration and exclude them from the vehicle statistics. This should be implemented from 1st Jan 2020.
- Develop a system for handling of scrapped vehicles and deregistration.
- Perform in-depth analyses of all fatal Bus accidents and expand to also other fatal accidents.
- Use safety rating data for the vehicle fleet to assess fleet quality.
- Introduce Whole Vehicle Approval standard rules.
- Make drivers of public transport buses responsible for daily vehicle inspections and establish a system of quality assurance.

Pillar 4: Safer Road Users

Enforcement:

- Develop an enforcement strategy with priority areas (Speed, Seatbelts, Helmets, Alcohol)
- Monitor and evaluate enforcement, introduce indicators (time spent on Speed, Seatbelts, Helmets, Alcohol)
- Coordinate activities with other stakeholders (Speeding, Alcohol, Seatbelts/helmets)
- Implement a centralised joint data base system for vehicle registration, driver license, insurance, road-worthiness inspections, tax, etc. and make it accessible to the relevant authorities.
- Improve human resources, capacity and equipment
- Implement a Crash Data Management System
- Improve Incident/Disaster Management coordination
- Clear rules for reporting of dead

Driver licensing:

- Adopt and implement an approved training syllabus for Driver Licensing education and follow up
- Learner permits for driving training under supervision of parents could be introduced for 4-wheelers
- Theoretical test should be updated according to international standard with more focus on risk perception and hazard detection, and digitalized
- Practical test should be updated according to international standard with more focus on driving in real traffic

- National driving license register
- Monitor and evaluate, introduce indicators

Road safety education in schools:

- Develop and introduce school education system for road safety in the school curriculum

Pillar 5: Post-crash Response

- Establish one national joint alarm number and coordination center (under Department of Disaster Management)
- Clarify roles and responsibilities for Incident/Disaster Management coordination
- Plan for a maximum response time and follow up
- Improve human resources and equipment
- Establish Trauma Center with defined roles and responsibilities
- Establish clear-cut roles and responsibilities for reporting of deaths within 30 days to the Police
- RTA statistics from MOH need to complement Police RTA statistics

4. Increase energy efficiency of vehicles

There are five core areas to be considered: financial measures; regulatory standards; inspection and maintenance programme; public outreach; and traffic management

a) Financial Incentives and Disincentives

Measures to include all or some of the following:

- Differential taxes and charges based on fuel efficiency or greenhouse gas emissions (or proxies such as engine size or vehicle weight).
- ‘Feebates’: a set of fees (surcharges) for fuel-inefficient old vehicles and rebates for the purchase of new fuel efficient vehicles, based on fuel-efficiency, GHG emission (CO₂) performance of the vehicle.
- Subsidies for purchasing alternative fuel vehicles or for converting traditional fuel vehicles to alternative fuel vehicles.
- Mandate government agencies to purchase hybrid, alternative fuel, or efficient vehicles for agency fleets

b) Regulatory Standards for Vehicle Fuel Efficiency

- Enforce Euro IV standards for vehicle emissions
- Develop fuel quality standards
- Negotiate with oil marketing companies for a BS IV (Euro IV equivalent) standard fuel

c) Inspection and Maintenance Programmes

- Enforcing operational efficiency of used vehicles through periodic inspection and maintenance programme.
- Mandatory vehicle emissions inspection, targeted primarily to local air quality.

d) Public Outreach and Awareness Programs

- Provision of information to car purchasers on vehicle performance, e.g. fuel consumption data in vehicle advertisements.
- Communicating the range of operational efficiency of vehicles and its monetary significance to consumers/drivers, such as in-car feedback instruments for eco-driving.
- Heavy vehicle environmental rating scheme.

e) Highway Traffic Management

- Implement intelligent transportation systems at key highways in order to minimise delay and idling.
- Rapid incident detection and clearance at low capacity highways.
- Improve highway, street, and intersection design standards that foster smooth flow of traffic.
- Adopt demand management programs.
- Add physical capacity if needed by adding lanes, bypasses, tunneling or other improvements.

5. Financing for Road Transport and Safety

- a) Explore PPP model for road network. Prepare model concession agreements with a balanced risk sharing mechanisms, standardizing of procurement conditions, carrying out of value for money analysis.
- b) Continue with private sector for bus transport services but develop stringent service level contracts.
- c) Impose cess on fuel, the proceeds of which go towards a Central Road Fund, which is used for construction and maintenance purposes.
- d) Institute a fund towards Road Safety, the proceeds of which should be channelized for developing and implementing road safety programmes.

6. Human Resource Development

- a) RGOB to explore partnering with various academic institutions in SAARC countries such as India, South-East Asian countries such as Thailand or countries with prestigious universities such as US, UK and Australia, for building capacities.
- b) Sufficient funds need to be budgeted for conduct of such trainings.

7. Improvements in Logistics Industry

- a) Develop physical infrastructure such as dry ports at other border crossing points especially as and when there is demand for such infrastructure
- b) Creation of a Cell or Department within MoIC that focuses on only logistics planning.

Urban Transport

1. Integrated land use and transport planning in major urban centres

2. Special focus on bus based public transport
 - a) Designing an efficient, reliable, economical city bus service with requisite support infrastructure in place (buses, depots, terminals, staff, ITS applications, bus operators, regulations, maintenance facilities, emission standards etc)
 - b) Incrementally move towards BRT system - reserve or secure the Right of way immediately
 - c) Fleet expansion to address the current gap and the replacement requirements. (significant proportion of the fleet is above 7 years of age)
 - d) Associated infrastructure requirements- depots, terminals, staff, maintenance facilities
 - e) ITS applications in PT
 - f) Bus route rationalization
 - g) Operational efficiencies
 - h) Reducing headways (from current 10-15 min to lower levels)
 - i) Regulatory mechanism for private operators to operate. Develop stringent service level contracts.
 - j) Innovative financing mechanisms - Commercial exploitation of resources
3. Other transport demand management measures
 - a) Encourage lower emission technology use and innovation
 - b) Parking management
4. Capacity building - Human Resources
 - a) Addressed the capacity gap through conducting workshops, providing technical assistance and designing programs on the lines of “training the trainers”
5. Innovative financing for sustainable transport
 - a) PPP in Thimphu BRT to be pursued
 - b) Utilizing Green Climate Funds for development of BRT civil works combined with the NMT elements as well as for procurement of low emission buses for Thimphu.
 - c) Thromdes should be encouraged to explore other innovative sources of financing such as land value capture financing, congestion charges

Civil Aviation

1. Expand international market base

- a) Tourism Council of Bhutan and Airline operators to collectively identify international markets
 - b) Facilitate code-sharing agreements with international operators by liberalizing provisions under ASAs.
 - c) ASAs to be signed only after consultation with the national carrier
 - d) There should be no restriction on entry of additional airline operators. New license should however be given based on sound appraisal of the business plan by BCAA.
2. Improve domestic connectivity
 - a) National carrier to continue with domestic operations with financial support from RGOB to be operationally sustainable. The financial support should be reviewed on a periodic basis
 - b) Boost helicopter services by encouraging RBHSL to actively undertake commercially operations till 31st Dec 2020
 - c) Review mechanism should be developed to evaluate the scope for private participation in helicopter services
 3. Develop a second international airport
 - a) In lieu of the constraints of Paro airport, additional international airport to be developed as a second gateway into Bhutan. RGOB to evaluate technical feasibility between Gelephu and Bumthang
 4. Aviation safety and security
 - a) BCAA to develop a State Safety Program (SSP) as per Annex 19 of Chicago Convention that will form the basis of formulation of Safety Management System (SMS) for airline operators.
 - b) Ensure real time safety tracking and prompt incident reporting.
 - c) Upgrade Air Navigation System as per ICAO's Global Air Navigation Plan.
 - d) Explore the feasibility of implementing GAGAN.
 5. Emergency response
 - a) Develop regulations for both helicopters for their use under a disaster situation
 - b) Develop regulations for drone for emergency medical situation and disaster relief
 6. Sustainable aviation
 - a) New technologies must be deployed to yield more efficient engines and aircraft, and better fuels.
 - b) Operational practices like weight-reduction measures and more efficient flight procedures and air-traffic control should be researched and adopted widely.
 - c) Improve airport infrastructure in terms of its siting, layout, and design which could reduce low-altitude emissions.

7. Aviation education and skill development

- a) Identify comprehensive training needs for the aviation industry and create an ecosystem for aviation capacity enhancement.
- b) Associate with the National Aviation University (NAU) in India or alternately establish a satellite campus in Bhutan.

Regional Connectivity

1. Strengthen additional Border Crossing Points

- a) Target diversifying trade to other border points of Samtse, Gelephu and Samdrup Jongkhar
- b) Develop better physical infrastructure and equipment for faster custom clearance
- c) Develop soft infrastructure and creating a secured electronic data management system

2. Developing alternate modes of connectivity

- a) Further build on the pre-feasibility carried out for:
 - Light Rail System in Thimphu City (running from North to South)
 - Light Rail Link between Paro to Chuzom (to connect with the Thimphu - Phuentsholing Line)
 - Heavy Rail Link between Thimphu and Phuentsholing
- b) Undertake technical feasibilities for development of waterways linking to India & Bangladesh

3. Further study the impact of BBIN

- a) Concerns of stakeholders are credible. RGOB should undertake relevant impact assessment studies, carry out trial runs on the identified routes and accordingly define clearly the rules of engagement under BBIN.

Changes in Current Governance Structure

1. RSTA's service delivery arm to be undertaken a new department named 'Department of Surface Transport'; regulatory role to be undertaken by creation of a Regulator.

The functions of the proposed regulator will be:

- Develop regulations for road traffic, vehicle registration, driver licensing, road worthiness and emission testing;
- Fix price band for different kinds of services in an objective and transparent manner;
- Ensure service coverage across regions (including rural and remote areas) and provide mechanism for compensation for discharge of universal service

- obligations (provision of service on non-remunerative routes and remote rural sector);
- benchmark quality of road passenger service;
 - impartially address various operational issues like access to terminals and other common infrastructure facilities to all operators; and
 - Promote competition to curb anti-competitive practices.
2. Creation of separate transport ministry in the long run & renaming of MoIC as Ministry of Transport & Communications
 3. Creation of a separate Department/ Cell within MoIC for governing freight and logistics sector
 4. Greater autonomy of Thromdes in urban transport planning
 5. Skill enhancement and capacity augmentation under the aegis of proposed ‘Department of Technical Education’
 6. Strengthening the involvement of National Land Commission Secretariat (NLCS) in transport planning

Changes in Legislative Framework

1. Roads Act 2013 to incorporate provisions for:
 - Road asset management system
 - Strengthening the provisions of private sector participation
 - Inclusiveness in road development
 - Dedicated road safety unit within DOR
2. RST Act 1999 to improve provisions for:

Provisions to improve road safety

- Driver licensing
- Vehicle fitness
- National register of motor vehicles
- Law on good Samaritans
- Establishment of National Road Safety Board
- Creation of a Road Safety management fund
- Clarifying the provisions on road safety audit under RST Act and Roads Act

Provisions to promote and enhance rural connectivity

- Exempting vehicles operating under a government scheme to get a permit
- Exempting stage carriage or contract carriage operating in rural areas to get a permit to promote low cost last mile connectivity

Other Provisions

- Automobile workshops
- Condemnation of vehicles

Annexures:

Annexure 1: List of participants in first workshop

Safety and Regulation	Environment & Sustainability	Inclusiveness	Innovation
Mr Prem Adhikari, RSTA	Mr Karma Pemba, RSTA	Mr Deki Zam, Draksho	Ms Lemo, ABTO
Mr Chador Wangdi, STCBL	Mr Sangay Wangdi, Insurance	Ms Dorji Wangmo, MoWHS	Mr Namkha Norbu, Guide Assoc
Mr Thinley Norbu, MFA	Mr Tshering Dorji, Freight	Dr Sanga Dorji, DAB	Mr Nim Dorji, BPC
Mr Wangdi Gyeltshen, BCAA	Mr Nidup, Taxi Assoc	Deki Yangzom, NCWC	Mr Sangay Tenzin, Tourism council
Mr Lungten Jamtsho, DOR	M/s Kholo Transport	Ms Tashi Wangmo, MoWHS	Mr Tshering Nidup, Freight
Mr Dorji Wangchuk, Freight	Mr. Sonam Tobgay, RSTA	Mr BB Tamang, Freight	Mr Karma, Taxi Assoc
Mr Karsang, Taxi Assoc.	Mr Sangay Tenzin, MoWHS	Mr Tezin Wangda, Freight	M/s Bumpa Transport
Mr Kesang Namgyel, Taxi Assoc.	Tshewang Zangmo, NEC	Ngawang Gyeltshen, RSTA	Mr Chandra Chhetri, BCCI
M/s Meto Transport	Mr Jochu Thinley, ABI	Mr Ugyen Thinley, MoE	
Mr Yeshey Phuntsho, Traffic Police	Bholanath Bhattarai, GNHC	Ms Kunzang Wangmo, GNHC	
Mr Bhimlal Suberi, MoIC	Mr Ugyen Tshering, MoF		

Annexure 2: List of participants in second workshop

Sr No.	Organization	Name	Designation
1	Road Safety and Transport Authority (RSTA)	Mr Karma Pemba	Officiating Director General
2	Ministry of Information and Communications (MoIC)	Mr Sithar Dorji	Sr. Planning Officer
3	United Nations Development Program (UNDP)	Ms Sonam Y. Rabgye	Program Analyst
4	United Nations Development Program (UNDP)	Mr Nar Bahadur Khatiwara	Program Analyst
5	Ministry of Works and Human Settlement (MoWHS)	Mr Sangay Tenzin	Specialist, PPD
6	Gross National Happiness Commission (GNHC)	Mr Phuntsho Wangyel	Chief Research Officer, RED
7	National Environment Commission (NEC)	Mr Sonam Dagay	Assistant Environment Officer
8	Road Safety and Transport Authority (RSTA)	Mr Pema Dema	Asst. Transport Officer
9	Road Safety and Transport Authority (RSTA)	Mr Prem P. Adhikari	Chief Regional Transport Officer
10	Bhutan Chamber of Commerce & Industry (BCCI)	Mr Yesi Dorji	Sr. Research Officer
11	Bhutan Civil Aviation Authority (BCAA)	Mr Pema Tashi	Superintendent, Air Navigation Services
12	Department of Air Transport (DoAT)	Ms Dawa Dema	Asst. Airport Manager
13	Thimphu Thromde	Ms Ugyen Unano	Assistant Engineer
14	Ministry of Finance (MoF)	Mr Ugyen Tshering	Dy. Chief Planning Officer, PPD
15	Ministry of Economic Affairs (MoEA)	Mr Tashi Penjor	Sr. Legal Officer, PPD
16	DLG, Ministry of Home and Cultural Affairs (MoHCA)	Mr Karma K Zangpo	Program Officer
17	Royal Bhutan Police (RBP)	Capt. Nangay Wanhchuk	Officer Commanding (OC)
18	Royal Bhutan Police (RBP)	Major Yashing Phuntsho	Superintendents of Police, Traffic Division

Annexure 3: Methodology for forecasting GHG emissions

Surface transport

For purpose of this analysis, following assumptions are taken.

- Automobile registration will increase by 6.75 per cent CAGR till 2040
- Share of taxis in total vehicles registered is assumed to be constant till 2040 at 6.81 per cent and Share of light personal vehicles at 61.82 per cent
- EV adoption of personal light vehicle is assumed at 2 per cent till 2023, 4 per cent from 2023 to 2030 and 10-30 per cent beyond 2030
- EV adoption of taxis is assumed at 2 per cent till 2023, 5 per cent from 2023 to 2030 and 10-40 per cent beyond 2030
- CO₂ emission is taken as 2.34 kg per liter from petrol and 2.68 kg per liter from diesel fuel which also include all CO emitted
- It is assumed that personal light vehicles on an average cover a distance of 10,000 km per year and taxis cover a distance of around 35,000 km per year
- Ratio of petrol and diesel vehicle is presently 60:40, is assumed to remain constant till 2040
- Mileage of petrol and diesel vehicle is assumed to be 15 km per liter
- It is assumed that mileage of petrol and diesel cars will increase by 0.5 per cent per annum

Sensitivity analysis on various assumptions

- Vehicle growth rate vs Mileage

		Vehicle growth rate				
		5%	6%	6.75%	8%	9%
	10	0.07	0.10	0.12	0.18	0.25
Mileage	13	0.05	0.08	0.10	0.15	0.20
(km per litre)	15	0.05	0.06	0.08	0.12	0.16
	18	0.04	0.06	0.07	0.11	0.14
	20	0.03	0.05	0.06	0.09	0.12

- Vehicle growth rate vs EV adoption rate

		Vehicle growth rate				
		5%	6%	6.75%	8%	9%
x times the EV adoption rate assumed	0.80	0.04	0.05	0.07	0.10	0.13
	0.90	0.04	0.06	0.07	0.11	0.15
	1.00	0.05	0.06	0.08	0.12	0.16
	1.10	0.05	0.07	0.09	0.14	0.18
	1.20	0.05	0.08	0.10	0.15	0.20

Civil Aviation

Traffic forecasts

- 1 Present number of passenger flown data of Druk Air and Tashi Air were analyzed.
- 2 Short and long term targets were estimated based on report of the ADB.
 - The international passenger count is expected to increase by 8% till 2020. The long term growth rate is expected to be 6% (2020 to 2040).
 - Domestic passenger count is expected to grow at 67% till 2020. The long term growth rate (2020 to 2040) of 10% has been factored in.

Emission related assumptions

- 1 Emissions due to national and international flights have been estimated separately and then added to get the consolidated figure.
- 2 Operating window is expected to be 6 hours on an average
- 3 According to Eurocontrol data, per kg. of fuel consumed:
 - 3.16 kg of CO₂ is emitted
 - 0.00102 kg of SO₂ is emitted
 - 0.02 kg of NO_x is emitted
- 4 International flights:
 - Average fuel consumption for A319 flight make assumed at 2240kg/hr based (Source: ATR)
 - Number of international ATMs = 4 which increases to 6 till 2040
 - Number of hours flown in Bhutan is expected to be 1 hour as of now which increases to 1.5 hours till 2040
- 5 Domestic flights:
 - Average fuel consumption for ATR42 flights is assumed to be 811 kg/hr
 - Number of domestic landing is expected to be 1 initially which increases to 36 till 2040
 - Average hours flown is expected to be 0.75 hours



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